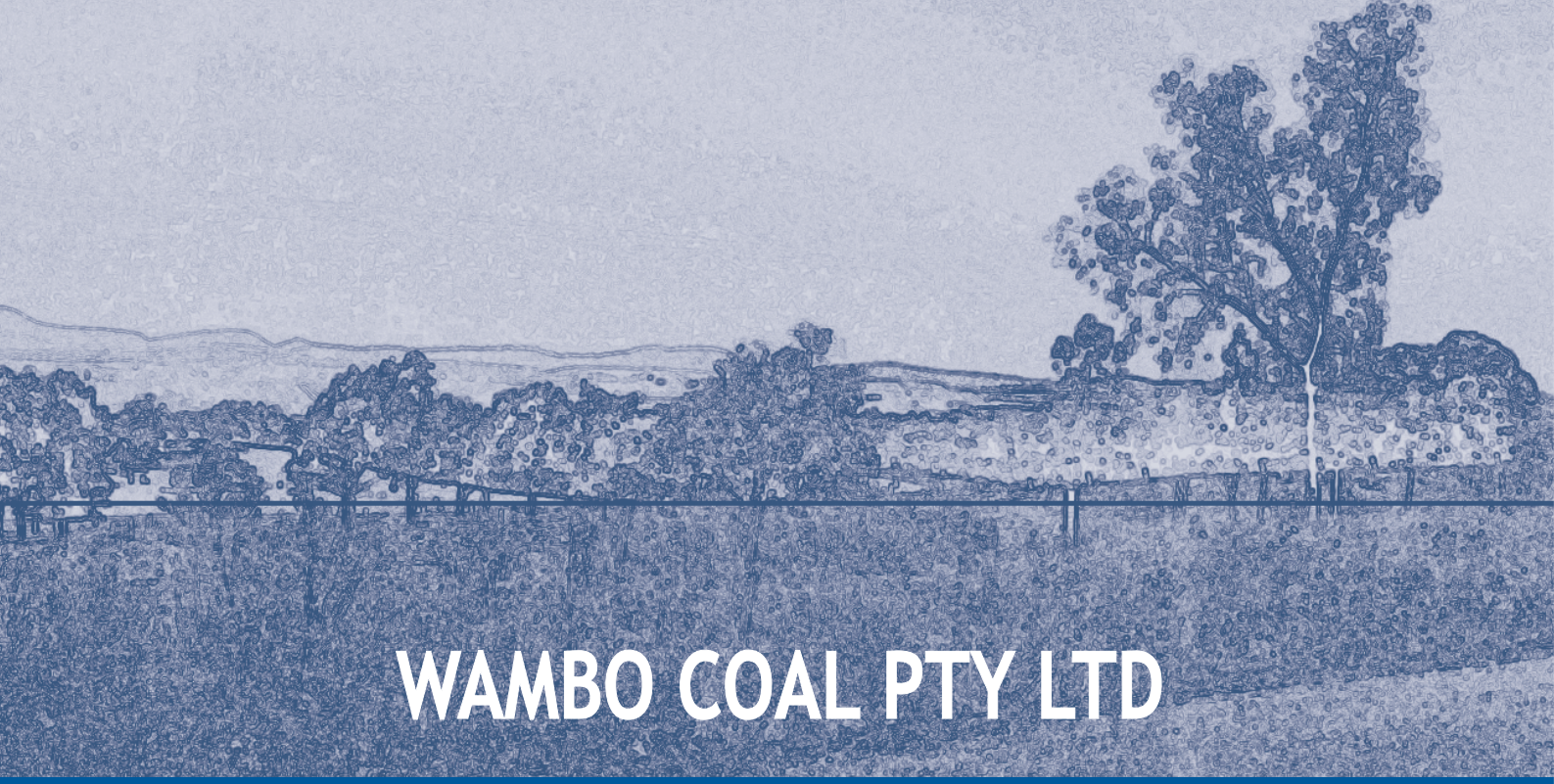


WAMBO COAL PTY LTD

NORTH WAMBO UNDERGROUND MINE

EXTRACTION PLAN
LONGWALLS 8 TO 10A

APPENDIX H
SUBSIDENCE MONITORING PROGRAM

Peabody ENERGY

WAMBO COAL MINE
NORTH WAMBO UNDERGROUND MINE

SUBSIDENCE MONITORING PROGRAM
LONGWALLS 8 - 10A

PREPARED BY
WAMBO COAL PTY LTD

APRIL 2015
Project No. WAM-09-15
Document No. 00667449.docx

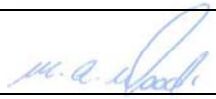
DOCUMENT CONTROL

Document No.	SMP LW8-10A
Title	Subsidence Monitoring Program for North Wambo Underground Mine Longwalls 8 to 10A
General Description	Monitoring program for subsidence effects for mining of Longwalls 8 to 10A at the North Wambo Underground Mine
Key Support Documents	

Revisions

Rev No	Date	Description	By	Checked
A	November 2012	Original Draft to DRE	M. Walker	M. Millgate
B	February 2013	Modification to DRE	M. Walker	M. Millgate
C	December 2013	Revised to include Longwalls 9 and 10	WCPL and Resource Strategies	M. Millgate
D	February 2014	Final for Submission	WCPL and Resource Strategies	M. Millgate
E	April 2015	Revised to include Longwall 10A	WCPL and Resource Strategies	M. Millgate

Approvals

	Name	Position	Signed	Date
Originator	M. Walker	NWU Underground Mine Surveyor		
Checked	M. Millgate	NWU Technical Services Superintendent		10/04/2015
Confirmed	M. Wood	NWU Manager of Mining Engineering		10/04/2015

The nominated Coordinator for this document is	Technical Services Superintendent

TABLE OF CONTENTS

Section			Page
1	INTRODUCTION		1
2	SCOPE		1
3	SUBSIDENCE EFFECTS MONITORING AND REPORTING		3
	3.1	SUBSIDENCE MONITORING DETAILS	3
	3.2	SURVEY ACCURACY AND FREQUENCY	5
4	MONITORING OF ENVIRONMENTAL CONSEQUENCES		9
5	ROLES AND RESPONSIBILITIES		9
6	REFERENCES		17

LIST OF TABLES

Table 1	Subsidence Effects Monitoring Program Summary
Table 2	Longwalls 8 to 10A Monitoring Program Summary
Table 3	Subsidence Monitoring Program Responsibilities Summary

LIST OF FIGURES

Figure 1	Locations of Surface Water and Groundwater Monitoring Sites
Figure 2	Locations of Biodiversity Monitoring Sites

LIST OF ATTACHMENTS

Attachment 1	Plan #02424
Attachment 2	Subsidence Impact Register
Attachment 3	Subsidence Monitoring Results Longwalls 1 to 8a
Attachment 4	Longwall 7 End of Panel Report

1 INTRODUCTION

The Wambo Coal Mine is an open cut and underground coal mining operation located approximately 15 kilometres west of Singleton, near the village of Warkworth, New South Wales (NSW). The Wambo Coal Mine is owned and operated by Wambo Coal Pty Limited (WCPL), a subsidiary of Peabody Energy Australia Pty Limited.

Development Consent DA 305-7-2003 for the Wambo Coal Mine was granted on 4 February 2004 by the then NSW Minister for Urban Affairs and Planning under Part 4 of the NSW *Environmental Planning and Assessment Act, 1979*.

The North Wambo Underground Mine is a component of the approved Wambo Coal Mine. The North Wambo Underground Mine commenced in 2005 and involves extraction of coal by longwall mining methods from the Wambo Seam within Mining Lease (ML) 1402, ML 1594, Coal Lease 397 and Consolidated Coal Lease 743.

A Subsidence Management Plan (SMP) for Longwalls 1 to 6 at the North Wambo Underground Mine (WCPL, 2006) was approved by the NSW Department of Primary Industries – Mineral Resources on 11 December 2006. An Extraction Plan for Longwalls 7 and 8 was approved by the NSW Department of Planning and Infrastructure (DP&I) for Longwall 7 on 16 May 2013 and for Longwall 8 on 24 September 2013. Subsequently, a revised Extraction Plan for Longwalls 7 to 10 was approved by the Department of Planning and Environment (DP&E) on 4 July 2014.

The approved Extraction Plan for Longwalls 7 to 10 has been revised to include the remaining longwall within the North Wambo Underground Mine extent (Longwall 10A) for a consolidated Extraction Plan for Longwalls 8 to 10A.

2 SCOPE

Purpose: This Subsidence Monitoring Program for Longwalls 8 to 10A outlines the monitoring program for subsidence effects for mining of Longwalls 8 to 10A at the North Wambo Underground Mine and a review of subsidence monitoring to date over Longwalls 1 to 6.

Scope: This Subsidence Monitoring Program covers the Longwall 8 to 10A Application Area.

This Subsidence Monitoring Program is a component of the North Wambo Underground Mine Longwalls 8 to 10A Extraction Plan. The Subsidence Monitoring Program has been prepared in accordance with Condition 22C(g) of Schedule 4 of the Development Consent (DA 305-7-2003), which states:

> *22C. The Applicant shall prepare and implement an Extraction Plan for the second workings within each seam to be mined to the satisfaction of the Secretary. Each Extraction Plan must:*
>
> *...*
>
> *(g) include the following to the satisfaction of DRE:*
>
> *...*
>
> - *a subsidence monitoring program to:*
>   - *provide data to assist with the management of the risks associated with subsidence;*
>   - *validate the subsidence predictions; and*
>   - *analyse the relationship between the subsidence effects and impacts under the plan and any ensuing environmental consequences;*
>
> …

This program has been prepared in consideration of the Draft *Guidelines for the Preparation of Extraction Plans Required under Conditions of Development Consents, Project Approvals and Mining Lease Conditions for Underground Coal Mining* (Version 5) (Department of Planning and Environment and NSW Trade & Investment – Division of Resources and Energy, 2015), which requires:

- proposed subsidence monitoring activities (individually specified);
- information or subsidence parameters to be obtained from each monitoring activity;
- proposed locations and/or extents where each monitoring activity will be undertaken, in particular, the proposed layout and/or locations of instrumentation, monitoring points or inspections (including graphical plans);
- proposed timing, frequency and duration of each monitoring activity;
- proposed monitoring methods, technologies, industry standards or Codes of Practice to be applied in undertaking each monitoring activity;
- proposed measures and procedures for quality assurance and competence of personnel undertaking monitoring activities;
- proposed procedures to record monitoring results;
- proposed reporting of monitoring results;
- capacity of the program to detect early warning of deviations from the defined performance measures and associated performance indicators;
- summarise and consolidate the various monitoring programs presented in each of the key component plans; and
- figures showing the monitoring sites for each of the various monitoring programs.

Proposed monitoring and reporting of subsidence effects for Longwalls 8 to 10A is described in **Section 3**, including a summary of the subsidence monitoring status and adequacy for Longwalls 4, 5 and 6. A summary of monitoring of subsidence impacts and environmental consequences is described in **Section 4**.

Attachment 4 of this report contains the Longwall 7 End of Panel Report which contains detailed information on a comparison of predicted and actual subsidence results and information on groundwater, surface water and bed and bank stability monitoring.

This Subsidence Monitoring Program has been prepared by WCPL. The appointment of the team of suitably qualified and experienced experts (which includes representatives from WCPL) will be endorsed by the Secretary of DP&E.

3 SUBSIDENCE EFFECTS MONITORING AND REPORTING

3.1 SUBSIDENCE MONITORING DETAILS

Subsidence monitoring within the North Wambo Underground Mine Longwalls 4 to 6 area has been achieved by ground survey using transects identified below and shown in Figure 2 (**Attachment 1**):

- Survey of line adjacent to Stony Creek (Pegs 1357-1499 - see SC1 in **Attachment 1**) to measure level and strain and multi-seam effects from North Wambo/Wollemi subsidence. Some survey marks for SC1 were destroyed by a June 2007 rainfall event and subsequent flooding and were unable to be reinstated.
- A centre line to measure level and strain that starts 550 metres (m) from the starting point of Longwall 1 and extends approximately 300 m from the end of the block towards the escarpment protection zone limits (see Figure CL1A in **Attachment 1**).
- A cross line XL1 (see line XL1 in **Attachment 1**) at chainage 1,200 m Longwall 1 that crosses United Workings (Arrowfield seam). This line has been offset in places to the south to avoid roads and Wambo Open Cut's West Cut Dam.
- A cross line XL2 (see line XL2 in **Attachment 1**) at chainage 2,200 m Longwall 1 that crosses Wollemi and Homestead workings (Whybrow seam).
- A cross line XL3 (see line XL3 in **Attachment 1**) at chainage 1,570 m Longwall 1.
- A cross line XL4 (see line XL4 in **Attachment 1**) at chainage 3,460 m Longwall 3.
- A cross line XL5 (see line XL5 in **Attachment 1**) at chainage 3,089 m Longwall 5.
- A centre line to measure level and strain that starts 570 m from the starting point of Longwall 3 and extends approximately 260 m from the end of the block towards the escarpment protection zone limits (see line CL3A in **Attachment 1**).
- A centre line that started 100 m from the finishing point of Longwall 3 and extended to approximately 50 m towards the crest of the highwall to measure level and strain (see line CL3B in **Attachment 1**). This line is installed on a rehabilitated dump area and is constricted by surrounding dumps and haul roads.
- A centre line to measure level and strain that starts 570 m from the starting point of Longwall 5 and extends approximately 3,280 m from the end of the block towards the escarpment protection zone limits (see line CL5A in **Attachment 1**).
- Monitoring of line CPLA (see line CPLA in **Attachment 1**) to monitor subsidence over Longwall 4 maingate 4 chain pillars.
- Monitoring of line CPLB (see line CPLB in **Attachment 1**) to monitor subsidence over the overlaying Homestead Underground Longwall 10A maingate chain pillars.

Further to these survey lines, ongoing visual inspections of the surface conditions over the panels have been carried out to determine whether severe damage has been caused or mitigation works are required.

To date some of the impacts caused by subsidence (and noted from visual inspections) include:

- Some surface cracking along the length of the Longwall 4, Longwall 5 and Longwall 6 blocks (up to 140 millimetres [mm] wide) that appears to "close up" as the Longwall moves away.
- Internal (Wambo owned) 11 kilovolt powerlines were isolated and rollers installed to allow movement were in place during active subsidence for Longwalls 4 and 5 and have now returned to normal use.

The surface features above Longwalls 8 to 10A are not significantly different from Longwalls 4, 5 and 6, with the exception of the following features:

- Wambo Homestead Complex.
- Wambo South Water Dam (a Prescribed Dam under the *Dams Safety Act, 1978*).

It is proposed that extensions of the current survey cross lines XL1, XL2, XL6 and a recommencement of United Colliery monitoring lines 8A and T will be appropriate for the subsidence monitoring of Longwalls 8 to 10A, along with ongoing visual inspections, to detect early warning of deviations from the subsidence predictions.

Line H will be used to monitor subsidence effects at the Wambo Homestead Complex. Lines XL2 and XL6 will be used to monitor subsidence effects near the Wambo South Water Dam. It is proposed to install line DL10A to monitor the end of Longwall 10A adjacent to Wollombi Brook.

Subsidence monitoring lines are monitored until negligible subsidence is detected. Discontinuance of survey of these lines will be totally at the discretion of the Division of Resources and Energy Principal Subsidence Engineer. Cross lines known as XL4 and WL5 were installed for over Longwalls 4 to 7 to maximise the measurement of multi-seam effects between the Wollemi/Homestead workings and North Wambo Underground Mine longwall panels. These lines can be seen in **Attachment 1**.

Due to the position of the Wambo South Water Dam it was decided in consultation with the Division of Resources and Energy (DRE), NSW Trade & Investment to terminate Line XL5 and XL4 at their junction and commence a new line XL6 to better monitor across Longwalls 8, 9 and 10 (see **Attachment 1**).

The DRE also requested the installation of line CPLC to monitor the NWU subsidence above the old Homestead UG Longwall 1 Maingate pillars (see **Attachment 1**).

Line SD was installed to monitor the base of the Wambo South Water Dam. The dam is dewatered below the critical levels for Longwalls 10 and 10A extraction.

Monitoring of parts of lines 'T' and '8A' (see lines 'T' and '8A' in **Attachment 1**) installed for the United Colliery will be resumed and will possibly provide valuable multi-seam data. These lines have been partially affected by Wambo Open Cut dump operations, North Wambo Creek diversion and the Homestead UG mains backfill drilling project.

The installation of all new lines that will serve as monitoring lines for Longwalls 8 to 10A will consist of star pickets driven to refusal with a mark then punched into the top and labelled. The marks will be capped with a protective cover that will be removed during survey.

Survey pegs shall generally be a minimum of 10 m and a maximum of 20 m apart.

Survey shall be carried out using either differential levelling to class LC accuracy or Trig heightening methods to an accuracy of class B as specified in the Inter-Governmental Committee on Surveying and Mapping Special Publication 1.

Details of any subsidence impacts observed would be recorded in the Subsidence Impact Register with visual observations documented in the Subsidence Impact Register Assessment Form (**Attachment 2**). Visual inspections would be undertaken in accordance with the inspection checklist provided in **Attachment 2**. The Subsidence Impact Register will be maintained as an electronic spreadsheet on-site, with hard copies of assessment forms filed in a folder.

The data collected under this monitoring program for Longwalls 8 to 10A will be provided to the Division of Resources and Energy in a timely fashion and a suitable format. **Attachment 3** contains subsidence monitoring results to date for Longwalls 4, 5, 6, 7 and 8a.

3.2 SURVEY ACCURACY AND FREQUENCY

The prescribed accuracy, as defined by the Inter-Governmental Committee on the Survey and Mapping Special Publication 1 (ICSM SP1) and the required frequency of the surveys can be seen in **Table 1**. Results for surveys that have already been completed can be seen in **Attachment 3**.

The proposed monitoring lines have been deemed adequate to monitor the subsidence for Longwalls 8 to 10A taking into account a review of monitoring results to date.

The three cross lines XL01, XL02 and XL03 are located to monitor subsidence from workings that are below the Wambo Seam, above the Wambo Seam and an area that has not been mined, respectively. These three lines combined with lines 7A, 8A and T (installed pre mining by United Colliery) should give an adequate range of data for the multi-seam effects that may affect the areas over Longwalls 8 to 10A.

Lines XL4, XL5, XL6 and CPLC should give multi seam data for Longwalls 8 to 10A and the interaction with Wollemi/Homestead secondary extraction.

Line CL7A and Line CL7B will be monitored until negligible subsidence is detected. Line CL9A and CL9B will further monitor centreline of block subsidence near the start of the Longwall 9 block and adjacent to the North Wambo Creek respectively. Further review of data post completion of each longwall will be carried out to confirm the monitoring program for each longwall.

Line DL10A will monitor end of block subsidence for Longwall 10A adjacent to Wollombi Brook.

3.3 SUBSIDENCE EFFECTS RECORDING AND REPORTING

Subsidence survey data for the North Wambo Underground Mine is stored by WCPL in a centralised database, with results from each survey clearly demarcated.

Subsidence survey data is provided to the Division of Resources and Energy Principal Subsidence Engineer promptly following each survey. Subsidence effects are also reported under the reporting framework of the Extraction Plan.

Table 1
Subsidence Effects Monitoring Program Summary

Survey Line	Data Type	Survey Accuracy Classification	Survey Frequency	Survey Status
Visual Inspections	As per the Subsidence Impact Register provided in **Attachment 2**	N/A	• Within 1 month of Longwall extraction that may cause surface movement. • 3 monthly or more frequent in areas of significance such as creeks, roads and buildings.	• As per monitoring program.
Line XL1	x, y, z	ICSM Class B or LC	• Twice prior to Longwall extraction that will cause surface movement. • After completion of each Longwall block.	• Base surveys pre LW01-LW07. • Post LW07 survey.
Line XL2	x, y, z	ICSM Class B or LC	• Twice prior to Longwall extraction that will cause surface movement. • After completion of each Longwall block.	• Base surveys pre LW01-LW07. • Post LW08a survey.
Line XL3	x, y, z	ICSM Class B or LC	• Twice prior to Longwall extraction that will cause surface movement. • After completion of each Longwall block.	• Base surveys pre LW01-LW07. • Post LW07 survey.
Line XL4	z (level and strain distances)	ICSM Class B or LC	• Twice prior to Longwall extraction that will cause surface movement (if possible). • After completion of each Longwall block.	• Base surveys pre LW03 - LW07. • Post LW09 survey.
Line XL5	z (level and strain distances)	ICSM Class B or LC	• Twice prior to Longwall extraction that will cause surface movement. • After completion of each Longwall block.	• Base survey pre LW06-LW07. • Post LW09 Survey.
Line T (United)	z (level and strain distances)	ICSM Class B or LC	• Twice prior to Longwall extraction that will cause surface movement. • After completion of each Longwall block.	• Post United Longwall 8 mining (Pre NWU LW06). • Large sections destroyed by open cut dump advances, North Wambo Creek diversion & Homestead UG shallow main headings backfill project. • Post LW07 Survey.

Table 1 (Continued)
Subsidence Effects Monitoring Program Summary

Survey Line	Data Type	Survey Accuracy Classification	Survey Frequency	Survey Status
Line 8A (United)	z (level and strain distances)	ICSM Class B or LC	• Twice prior to Longwall extraction that will cause surface movement. • After completion of each Longwall block.	• Post United Longwall 8 mining (Pre NWU LW06). • Sections destroyed by open cut dump advances, North Wambo Creek diversion & Homestead UG shallow main headings backfill project. • Post LW07 Survey.
Line CL7A	z (level and strain distances)	ICSM Class B or LC	• Twice prior to Longwall extraction that will cause surface movement. • After completion of each Longwall block.	• Base survey pre LW07. • Post LW08a Survey.
Line CL7B	z (level and strain distances)	ICSM Class B or LC	• Twice prior to Longwall extraction that will cause surface movement. • After completion of each Longwall block.	• Base survey pre LW07. • Installed on small old rehab surface area above LW07 recovery block end in Wambo UG powerline corridor. • Post LW08a Survey.
Line XL6	z (level and strain distances)	ICSM Class B or LC	• Twice prior to Longwall extraction that will cause surface movement. • After completion of each Longwall block	• Base survey pre LW07. • Post LW09 Survey.
Line CPLC	z (level and strain distances)	ICSM Class B or LC	• Twice prior to Longwall extraction that will cause surface movement. • After completion of each Longwall block	• Base survey pre LW07. • Post LW09 Survey.
Line CL9A	z (level and strain distances)	ICSM Class B or LC	• Twice prior to Longwall extraction that will cause surface movement. • After completion of each Longwall block.	• Base survey pre LW08a. • Post LW09 Survey.

Table 1 (Continued)
Subsidence Effects Monitoring Program Summary

Survey Line	Data Type	Survey Accuracy Classification	Survey Frequency	Survey Status
Line H (United)	x, y, z	ICSM Class B or LC	• Twice prior to Longwall extraction that will cause surface movement. • After completion of each Longwall block.	• Post United Longwall 8 mining. • Base Survey pre LW07. • Post LW07 Survey.
DL10A	z (level and strain distances)	ICSM Class B or LC	• Twice prior to Longwall extraction that will cause surface movement. • After completion of each Longwall block.	• To be installed pre LW10A.

4 MONITORING OF ENVIRONMENTAL CONSEQUENCES

The various monitoring programs presented in each of the management plans under the Extraction Plan are summarised in **Table 2** and the location of environmental monitoring sites included in Wambo's various environmental monitoring programs are presented in **Figures 1 and 2**.

Figure 1 presents the location of surface water and groundwater monitoring sites.

Figure 2 presents the location of biodiversity monitoring sites. As described in **Table 2**, visual observation of the Wollemi National Park escarpment will be undertaken as part of the BMP monitoring program.

Details of any subsidence impacts observed will be recorded in the Subsidence Impact Register with visual observations documented in the Subsidence Impact Register Assessment Form as provided in **Attachment 2**. Visual inspections will be undertaken in accordance with the inspection checklist provided in **Attachment 2**.

The Subsidence Impact Register will be maintained as an electronic spreadsheet on-site, with hard copies of assessment forms filed in a folder.

5 ROLES AND RESPONSIBILITIES

Key responsibilities of WCPL personnel in relation to this Subsidence Monitoring Program are summarised in **Table 3**. Responsibilities may be delegated as required.

Table 2
Longwalls 8 to 10A Monitoring Program Summary

Management Plan	Monitoring Component	Parameter	Frequency
Water Management Plan	General surface water monitoring.	• Monitoring of surface water flow and quality along North Wambo Creek, Wambo Creek, Stony Creek and Wollombi Brook in accordance with the SWMP.	• In accordance with the SWMP.
	General mine water quality.	• Monitoring of water quality in mine water storage dams in accordance with the SWMP.	• In accordance with the SWMP.
	Bed and bank stability.	• Monitoring to distinguish between natural erosion and erosion from mine subsidence instability in North Wambo Creek, Wambo Creek and Stony Creek.	• In accordance with the SWMP.
	General groundwater monitoring.	• Monitoring of groundwater level and quality within the vicinity of the Wambo Coal Mine.	• In accordance with the GWMP.
	Subsidence impacts to the North Wambo Creek alluvium.	• Monitoring of groundwater levels in the North Wambo Creek alluvium.	• In accordance with the NWCSRS.
	Subsidence impacts to Wollombi Brook.	• Rate of water pumped from North Wambo Underground Mine roadways.	• When pumping is required.
Land Management Plan	Stock fences.	• Visual observation to record the initial condition of stock fences. • Visual observations to record the condition of stock fences following extraction of Longwalls 8 to 10A.	• Prior to secondary extraction of Longwalls 8 to 10A. • Following completion of secondary extraction of Longwalls 8 to 10A.
	Ground surface.	• Visual observation to record the initial condition of the ground surface. • Visual observations of the ground surface behind the longwall face to identify potential surface cracks and/or potholes. • Visual observations of low lying areas to identify potential surface ponding.	• Prior to secondary extraction of Longwalls 8 to 10A. • Monthly inspections during secondary extraction of Longwalls 8 to 10A, increased to weekly inspections during extraction of Longwall 8b. • Monthly inspections during secondary extraction of Longwalls 8 to 10A and/or following a significant rainfall event (i.e. 20 mm within 24 hours, midnight to midnight).

Table 2 (Continued)
Longwalls 8 to 10A Monitoring Program Summary

Management Plan	Monitoring Component	Parameter	Frequency
Biodiversity Management Plan	General monitoring of flora, fauna and aquatic ecosystems.	• Monitoring in accordance with the FFMP. • Annual plant cover abundance and Biometric monitoring at three sites in the vicinity of Longwalls 8 to 10A. • Monitoring of an *Acacia pendula* patch above Longwall 10A.	• In accordance with the FFMP. • Annually. • Annually.
	Subsidence impacts to Wollemi National Park escarpment.	• Visual observations to record the Wollemi National Park escarpment cliff stability (including photographic record).[1]	• On a quarterly basis while the active longwall face is within 2 km of the Wollemi National Park escarpment.
Heritage Management Plan	Subsidence impacts to the WHC.	• Monitoring in accordance with the WHCMMP. • Photographic records of the condition of WHC Buildings No. 1 to 8. • Observations of cracking of masonry. • Observations of loss of structural integrity.	• In accordance with the WHCMMP. • After the mining of each longwall has been completed. • Monthly during active subsidence. • Following completion of Longwall 8.

Table 2 (Continued)
Longwalls 8 to 10A Monitoring Program Summary

Management Plan	Monitoring Component	Parameter	Frequency
Built Features Management Plan – WCPL Asset Management Plan	All built features.	• Visual observations to record the general condition of WCPL assets including safety and serviceability.	• Monthly inspection during secondary extraction of Longwalls 8 to 10A.
	Above ground powerlines.	• Monitoring of the location of the base and top of each power pole (if rollers not installed). • Monitoring of the vertical distance from the ground to lowest point of the powerline between each power pole pair (i.e. conductor clearance) (if rollers not installed).	• Prior to secondary extraction within 100 m of WCPL powerline and undertaken at 50 m intervals until the active mining face is 100 m past the powerline.
	Active service lines.	• Visual observations to record the general condition of WCPL active service lines including safety and serviceability.	• Daily inspections commencing when secondary extraction is within 100 m of WCPL active service lines and undertaken until the active mining face is 100 m past the line.
	Roads and tracks.	• Visual observations to record condition of roads and tracks, including surface cracks, buckling and general safety.	• Prior to secondary extraction within 100 m of any WCPL asset and undertaken at 50 m intervals until the active mining face is 100 m past the WCPL asset.
	Mine dewatering and water supply pipelines.	• Monitoring of pipeline integrity at fixed points. • Monitoring to detect abnormal changes in flow.	• Daily inspections commencing when secondary extraction is within 100 m of WCPL active service lines and undertaken until the active mining face is 100 m past the pipeline. • Continuous (SCADA) monitoring of pump and pipeline conditions.
	Farm dams.	• Visual observations to record condition of embankment, freeboard, evidence of erosion and general safety.	• Prior to secondary extraction within 100 m of any WCPL asset and undertaken at 50 m intervals until the active mining face is 100 m past the WCPL asset.

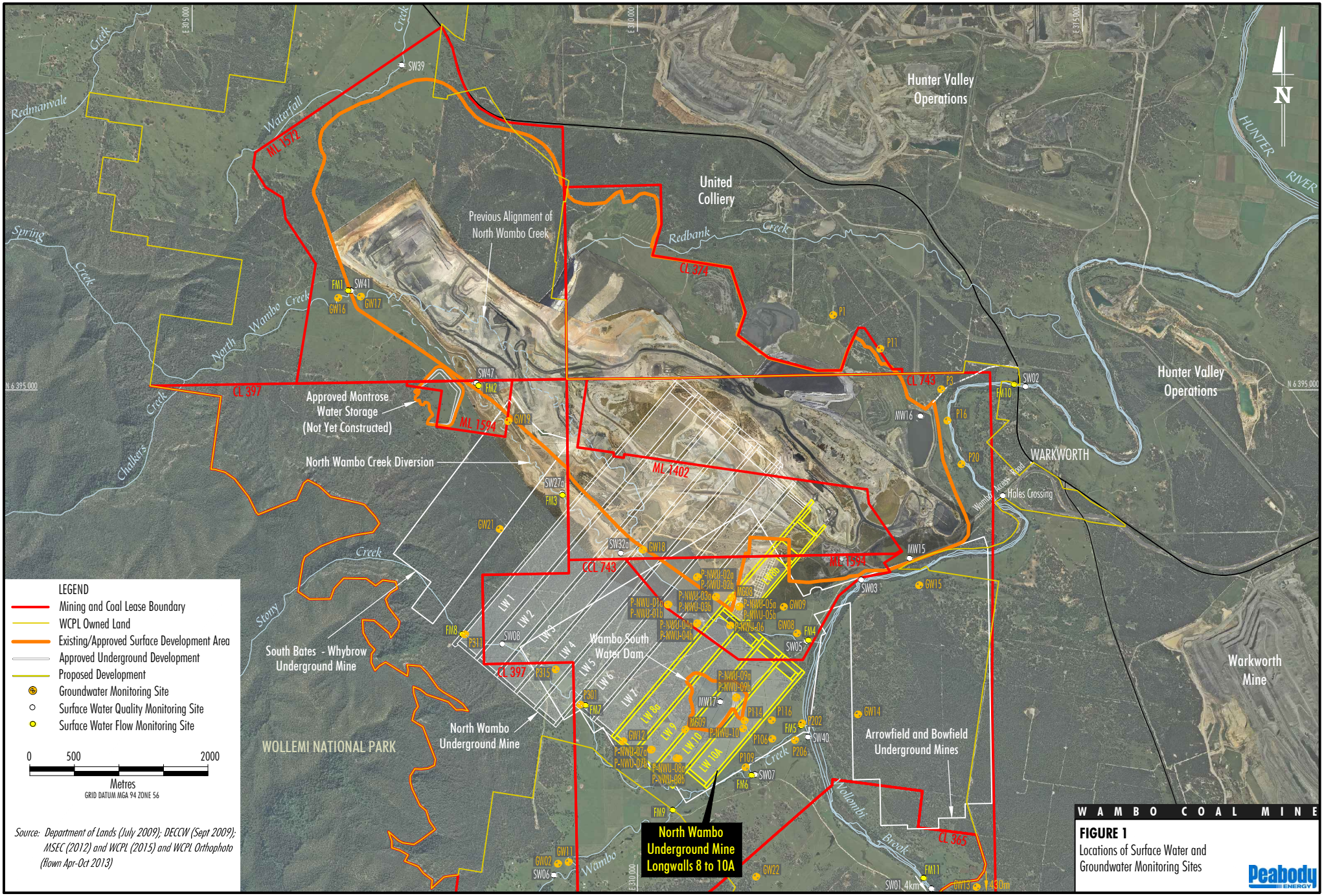
Table 2 (Continued)
Longwalls 8 to 10A Monitoring Program Summary

Management Plan	Monitoring Component	Parameter	Frequency
Built Features Management Plan – Prescribed Dam Management Plan	Wambo South Water Dam.	• Water level in Wambo South Water Dam (transducer reading on CITECT). • Water level in Wambo South Water Dam (surveyed water level). • Visual inspections of Wambo South Water Dam, including condition of: embankment; stormwater catchment drain on western side of dam; and dam level stake.	• Manual check weekly and following significant rainfall event. • Monthly • Weekly inspections commencing when secondary extraction is within the Notification Area and undertaken until the active mining face is 100 m past the Notification Area and following significant rainfall event.
	Underground workings.	• Visual inspections of underground workings (including longwall progression and geological features encountered). • Rate of water pumped from North Wambo Underground Mine roadways and Whybrow Seam.	• Daily inspections during extraction of Longwalls 8 to 10A. • When pumping is required.
Built Features Management Plan – Right-of-Way Management Plan	Right-of-way in favour of several private properties.	• Visual observations to record condition of road, including surface cracks, buckling and general safety. • Visual assessment of the effectiveness of warning signs.	• Prior to secondary extraction within 100 m of the right-of-way and undertaken at 50 m intervals until the active mining face is 100 m past the right-of-way. • Monthly inspections during secondary extraction.

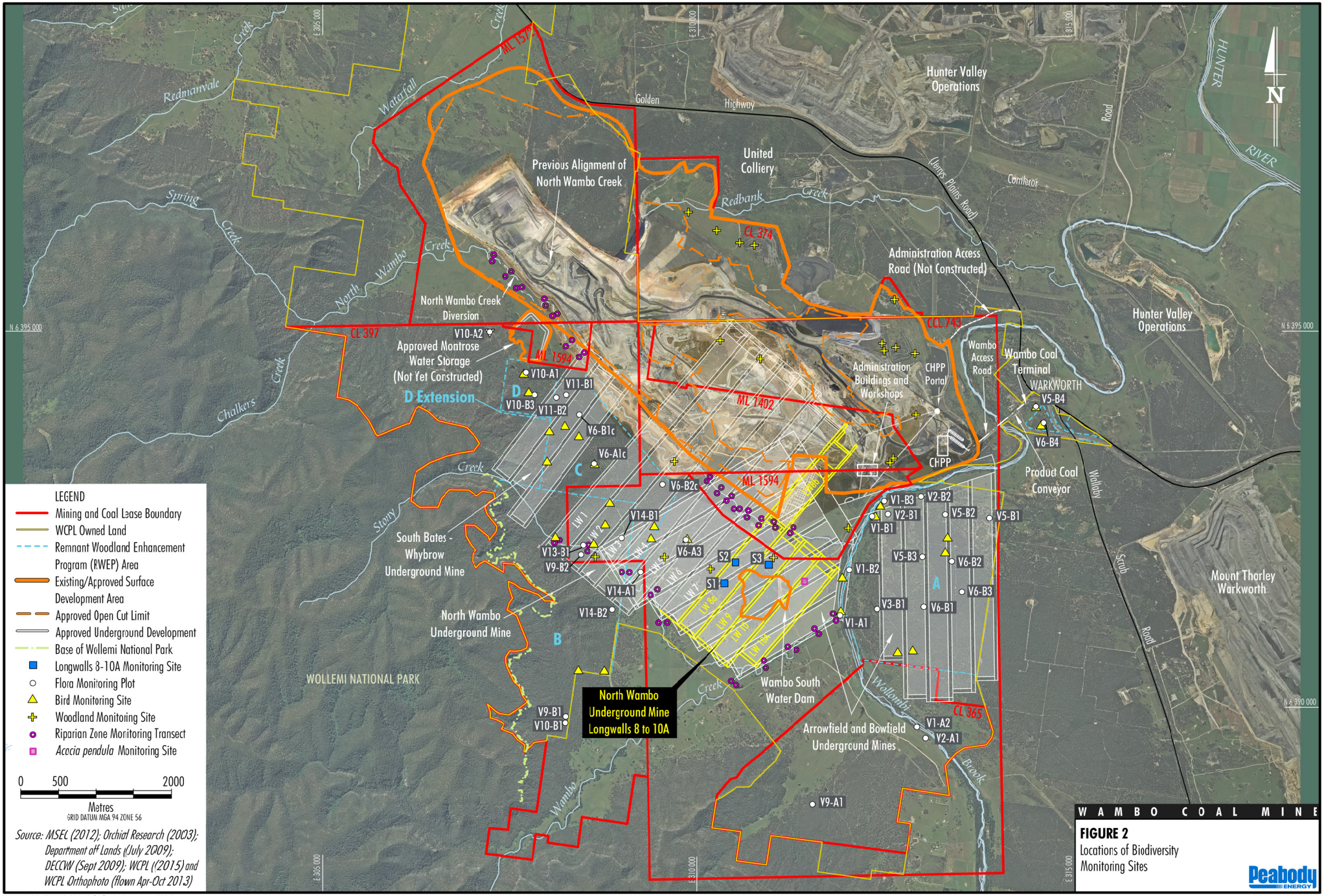
Table 2 (Continued)
Longwalls 8 to 10A Monitoring Program Summary

Management Plan	Monitoring Component	Parameter	Frequency
Public Safety Management Plan	Fences.	• Visual observation to record the initial condition of fences. • Visual observations to record the condition of fences during extraction of Longwalls 8 to 10A. • Visual observations to record the condition of fences following extraction of Longwalls 8 to 10A.	• Prior to secondary extraction of Longwalls 8 to 10A. • Monthly inspections during secondary extraction of Longwalls 8 to 10A. • Following completion of secondary extraction of Longwalls 8 to 10A.
	Warning signs.	• Visual observation to record the initial condition of existing warning signs (e.g. legibility). • Visual observations to record the condition of warning signs (e.g. legibility) during extraction of Longwalls 8 to 10A.	• Prior to secondary extraction of Longwalls 8 to 10A. • Monthly inspections during secondary extraction of Longwalls 8 to 10A.

[1] Visual inspection will be conducted from areas accessible by vehicle for signs of freshly exposed rock face or debris, or areas of significant vegetation dieback.



WAM-09-15_EP LW8-10A_Subsidence Monitoring_101Adwg



WAM-09-15_EP LW8-10A_Subsidence Monitoring_102C

Table 3
Subsidence Monitoring Program Responsibilities Summary

Responsibility	Task
General Manager	• Ensure resources are available to WCPL personnel to facilitate the completion of responsibilities under this Subsidence Monitoring Program.
NWU Manager of Mining Engineering	• Ensure this Subsidence Monitoring Program is implemented.
Technical Services Manager	• Ensure monitoring and reporting required in accordance with this Subsidence Monitoring Program is carried out within specified timeframes, are adequately checked and processed and are prepared to the required standard.
Underground Mine Engineer	• Undertake visual monitoring required in accordance with the Extraction Plan and ensure the Subsidence Impact Register is kept up to date and hard copies of the assessment forms are filed/stored correctly. • Become familiarised with environmental aspects which require monitoring in accordance with the Extraction Plan.
Mine Surveyor	• Undertake all monitoring in accordance with this Subsidence Monitoring Program to the required standard within the specified timeframes and ensure data are adequately checked, processed and recorded.

6 REFERENCES

Department of Planning and Environment and NSW Trade & Investment – Division of Resources and Energy (2015) *Guidelines for the Preparation of Extraction Plans Required under Conditions of Development Consents, Project Approvals and Mining Lease Conditions for Underground Coal Mining.* Version 5. Draft.

Wambo Coal Pty Limited (2003) *Wambo Development Project Environmental Impact Statement.*

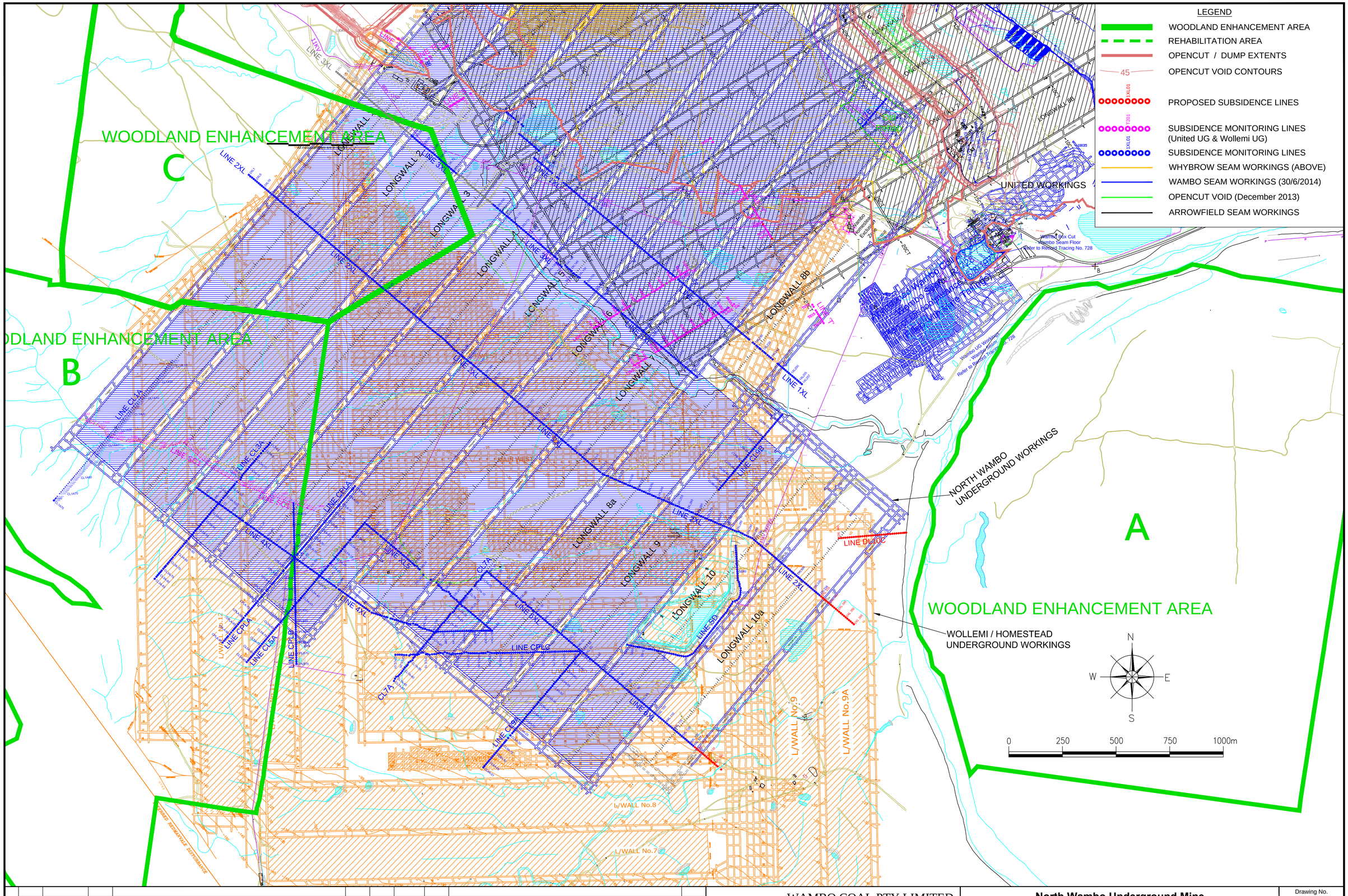
Wambo Coal Pty Limited (2005) *Wambo Development Project – Wambo Seam Underground Mine Modification Statement of Environmental Effects.*

Wambo Coal Pty Limited (2006) *Wambo Development Project – North Wambo Underground Mine Subsidence Management Plan*.

Wambo Coal Pty Limited (2012) *North Wambo Underground Mine Modification Environmental Assessment.*

ATTACHMENT 1

PLAN #02424



REVISIONS

REV.	DATE	BY	DESCRIPTION	CHK.	REV.	DATE	BY	DESCRIPTION	CHK.

WAMBO COAL PTY LIMITED
ABN 13 000 668 057
Jerry's Plains Rd, Warkworth
Via Singleton, NSW, 2330
Phone: 02 65 702200
Fax: 02 65 702290
Prepared by NWU Survey Ph: 02 65 702318

North Wambo Underground Mine
PROPOSED SUBSIDENCE MONITORING PROGRAM
Extraction Plan Longwall 8 - 10A

Drawing No.	Revision No.
02424	R-25/3/2015

Date	Scale:	Drawn	Checked	Approved	Sheet Size
05/09/2007	1:8000	MJW	MM	MW	A1

ATTACHMENT 2

SUBSIDENCE IMPACT REGISTER

Table A2-1
Example Subsidence Impact Register (Electronic Version Maintained On-Site)

Impact Register Number[1]	Impact Description	Does Impact Exceed the Performance Measure/Indicators? (Yes/No/ Not Applicable)	Management Measures Implemented	Were Management Measures Effective? (Yes/No)

Notes:

1: Fill out all details in the Assessment Form and record the register number here.

SUBSIDENCE IMPACT REGISTER ASSESSMENT FORM		
Date and Time		
Observer (Name and position)		
Register Number (i.e. Number 1, 2, etc.)		
Longwall Number		
Longwall Chainage		
Area Inspected Examples: location of crack, include GPS co-ordinates and a sketch		
INSPECTION ITEM	**CHECKED**	**COMMENTS** (Examples: nature and extent of impact, any relevant information, attach photographs)
Surface Cracking		
Surface Humps (compression)		
Surface Ponding		
Access Tracks/Serviceability of built features		
Warning Signage		
Powerline – poles, insulators, conductors, conductor clearance		
Other		
Actions Required		
Management or Contingency Measures Implemented		
Effectiveness of Management or Contingency Measures		
WCPL Key Personnel Notified (include date of email)		
Technical Services Superintendent	☐ __/__/____	
Director: Technical Services and Projects	☐ __/__/____	
Environment and Community Manager	☐ __/__/____	

SUBSIDENCE INSPECTION CHECKLIST

WHERE TO INSPECT

- 500 metres behind and 100 metres in front of the current longwall face position.

EXTENT OF INSPECTION

- Include the area of active subsidence based on the 26.5 degree angle of draw.

WHAT TO LOOK FOR

- **Surface Cracking**: inspect edges of extraction void and travelling abutments.
- **Surface Humps**: inspect near centre of extracted panels and travelling abutment.
- **Surface Ponding**: inspect low lying areas for evidence of increased/new ponding.
- **Access Tracks**: inspect for step change in land surface and changes in access for serviceability.
- **Warning Signage**: inspect condition and legibility of relevant warning signage.
- **Powerlines**: inspect for changes of conductor clearance and power pole condition.
- Check the serviceability of built features (e.g. fences, buildings, dams and access tracks).
- Note any flooding hazards for access tracks.
- Carry out any inspections required in accordance with the Built Features Management Plan for Longwalls 8 to 10A.

ACTIONS IF AN IMPACT IS IDENTIFIED

1. Employ additional subsidence warning signs if necessary.
2. Notify Key Personnel (including asset owner if relevant [e.g. if asset is not a WCPL-owned asset]).
3. Assess impact against requirements of the relevant TARP and implement actions as required.
4. Record implemented actions in the Subsidence Impact Register Assessment Form.
5. Notify the principal subsidence engineer.
6. Notify other stakeholders as required (e.g. DP&E, DRE etc.).

ATTACHMENT 3

SUBSIDENCE MONITORING RESULTS LONGWALLS 1 TO 8a

Peabody

Memo

To:	Troy Favell	**Cc:**	Michael Millgate
From:	Mal Walker		
Date:	5/11/2014		
Subject:	LW8a Actual vs. Predicted Subsidence		

☐ Urgent ☐ For Review ☐ Please Comment ☐ Please Reply ☐ Please Recycle

In accordance with Consent Condition 22, Schedule 4 of DA 305-7-2003-i, Wambo Coal Pty Ltd (Wambo) commissioned DgS (Ditton Geotechnical Services Pty Ltd) to conduct a detailed subsidence impact assessment for Longwall Panels 7 and 8 as part of the North Wambo Underground Mine (NWU) Subsidence Management Plan / Extraction Plan (SMP/EP).

Revised subsidence predictions for Longwall's 7 and 8 have been generated using two empirically based prediction models (ACARP, 2003 and SDPS®) and measured subsidence effects at the NWU to-date. A separate report (DgS, 2012a) has been prepared in support of the Extraction Plan/SMP that reviews the measured subsidence at NWU to date and confirms that the prediction methodology is suitable for the prediction of subsidence for NWU LW7 and 8. The revised predictions of subsidence effects have been compared with the Holt 2005 predictions. Actual S_{max} values measured following extraction of LW07 (Table A-1) fall within the ranges indicated by the SMP.

It should also be noted that the actual S_{max} values reported (Table A-1) are absolute maximums measured at each chainage. Averaging S_{max} values across the base of the subsidence trough (for transverse lines) yields lower and potentially more realistic measurements. Subsidence profiles for each of the monitoring lines analysed (where maximum values are available due to placements over LW8a) are appended below (Figures A1 – A4).

Maximum tilt (T_{max}) values have been calculated for each subsidence monitoring point on the monitoring lines overlying and adjacent to LW08a. 100% of the Tmax values were below the predicted T_{max} ranges indicated by the SMP/EP (Table A-2)

Observations and measurements following extraction of LW8a are generally consistent with those from LW01 – LW07 and largely fit within the predicted ranges indicated by the SFM.

REFERENCES

Strata Engineering Australia Pty Ltd, 2006. Subsidence Impact Assessment for LWs 1 to 6 at the Proposed North Wambo Mine, Prepared For Wambo Coal Pty Ltd, February 24, 2006.

Wambo Coal Pty Ltd, 2006. North Wambo Underground Mine Subsidence Management Plan, March, 2006.

APPENDICES

TABLES

TABLE A-1 - Actual vs. Predicted S_{max} values for LW07

TABLE A-2 - Actual vs. Predicted T_{max} Values for LW07

FIGURES

FIGURE 1- Subsidence Profile for Monitoring Line CL5A

FIGURE 2- Subsidence Profile for Monitoring Line 4XL

FIGURE 3 - Subsidence Profile for Monitoring Line 5XL

FIGURE 4- Subsidence Profile for Monitoring Line CL7A

FIGURE 5- Subsidence Profile for Monitoring Line CPLC

FIGURE 6- Subsidence Profile for Monitoring Line 6XL

FIGURE 7- Subsidence Profile for Monitoring Line 2XL

FIGURE 8 - Subsidence Profile for Monitoring Line 3XL

FIGURE 9 - Subsidence Profile for Monitoring Line 1XL

FIGURE 10 - Subsidence Profile for Monitoring Line CL7B

FIGURE 11 - Subsidence Profile for Monitoring Line United 8A (Multi seam)

FIGURE 12- Subsidence Profile for Monitoring Line United T (Multi seam)

Peabody

Table A-1 Actual vs. Predicted Smax values for LW07

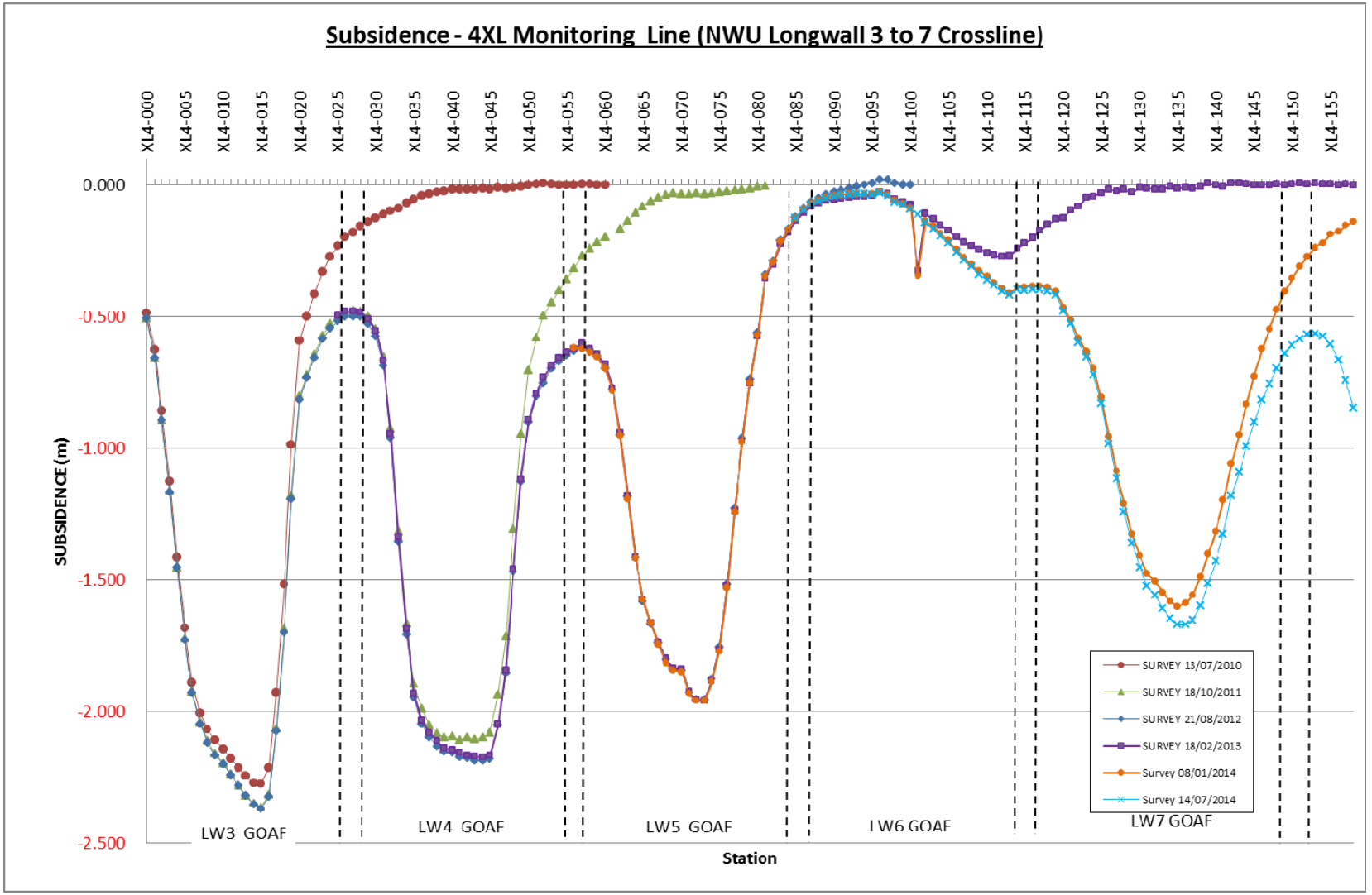
Monitoring Line ID	Monitoring Point ID	Actual Chainage of Monitoring Line	Depth of Cover (m)	Predicted Smax (m)	Actual Smax (m)	Difference (m)	Within Predicted Range
CL7A	CL7A-31	0-430		1.75- 3.31	2.22	-1.09	√
CPLC	CPLC-24	0-141		1.75- 3.31	1.83	-1.48	√
6XL	6XL-01	430		1.75- 3.31	2.02	-1.29	√
NWU2XL	2XL-183	1125	150-180	1.88	1.53	-0.35	√

Table A-2 Actual vs. Predicted Tmax values for LW07

Monitoring Line ID	Monitoring Point ID	Actual Chainage of Monitoring Line	Depth of Cover (m)	Predicted Tmax (mm/m)	Actual Tmax (mm/m)	Difference (mm/m)	Within Predicted Range
NWU4XL	XL4-126	0-561	230-395	36	11.30	-24.7	√
NWU5XL	NWUXL541	234	222-243	24	15.60	-8.4	√
CL7A	CL7A-44	0-430	209-237	24 - 71	22.90	-48.1	√
CPLC	CPLC-22	0-141	202-230	24 - 71	17.50	-53.5	√
6XL	6XL-09	430	194-209	24 - 71	31.40	-39.6	√
NWU2XL	2XL-186	1125	150-180	82	28.70	-53.3	√

*Multi seam
Note: values shown in tables above are limited to the latest Longwall subsidence areas only
REFERENCE: LW7-8 Extraction Plan, Table 10, DgS Report No. NWU-001/6
Smax values highlighted are Table 6, DgS Report No. NWU-001/6, U95% Final panel Smax values.

Figure 1 Subsidence Profile for Monitoring Line 4XL



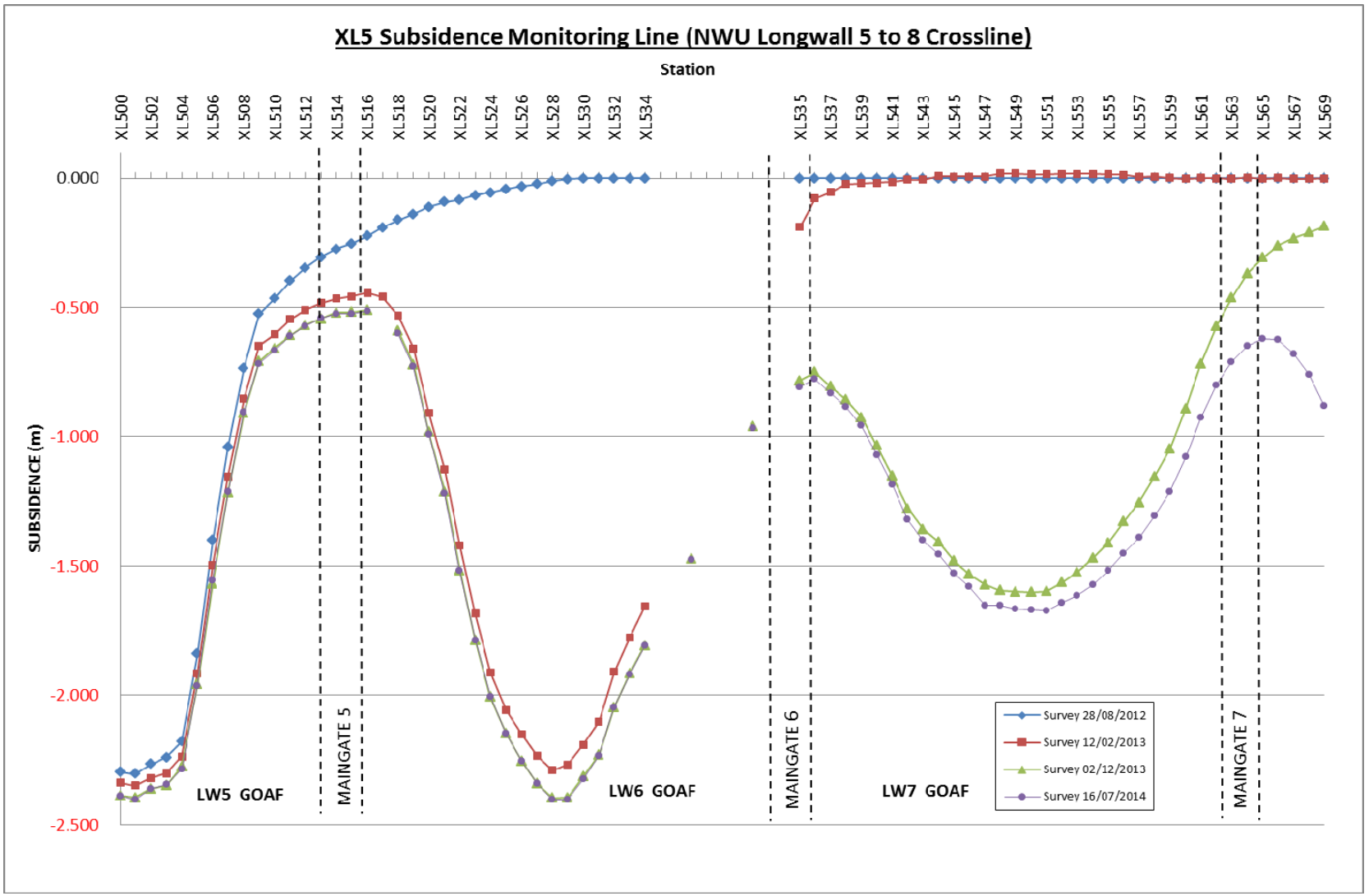
Wambo Coal Pty Ltd
Registered Office
Level 13, BOQ Building
259 Queen Street, Brisbane Qld 4000

ACN 000 668 057
Postal Address
PMB 1
Singleton NSW 2330

Tel +61 (0) 2 6570 2200
Fax +61 (0) 2 6570 2290
www.peabodyenergy.com.au

Peabody

Figure 2 Subsidence Profile for Monitoring Line NWU5XL

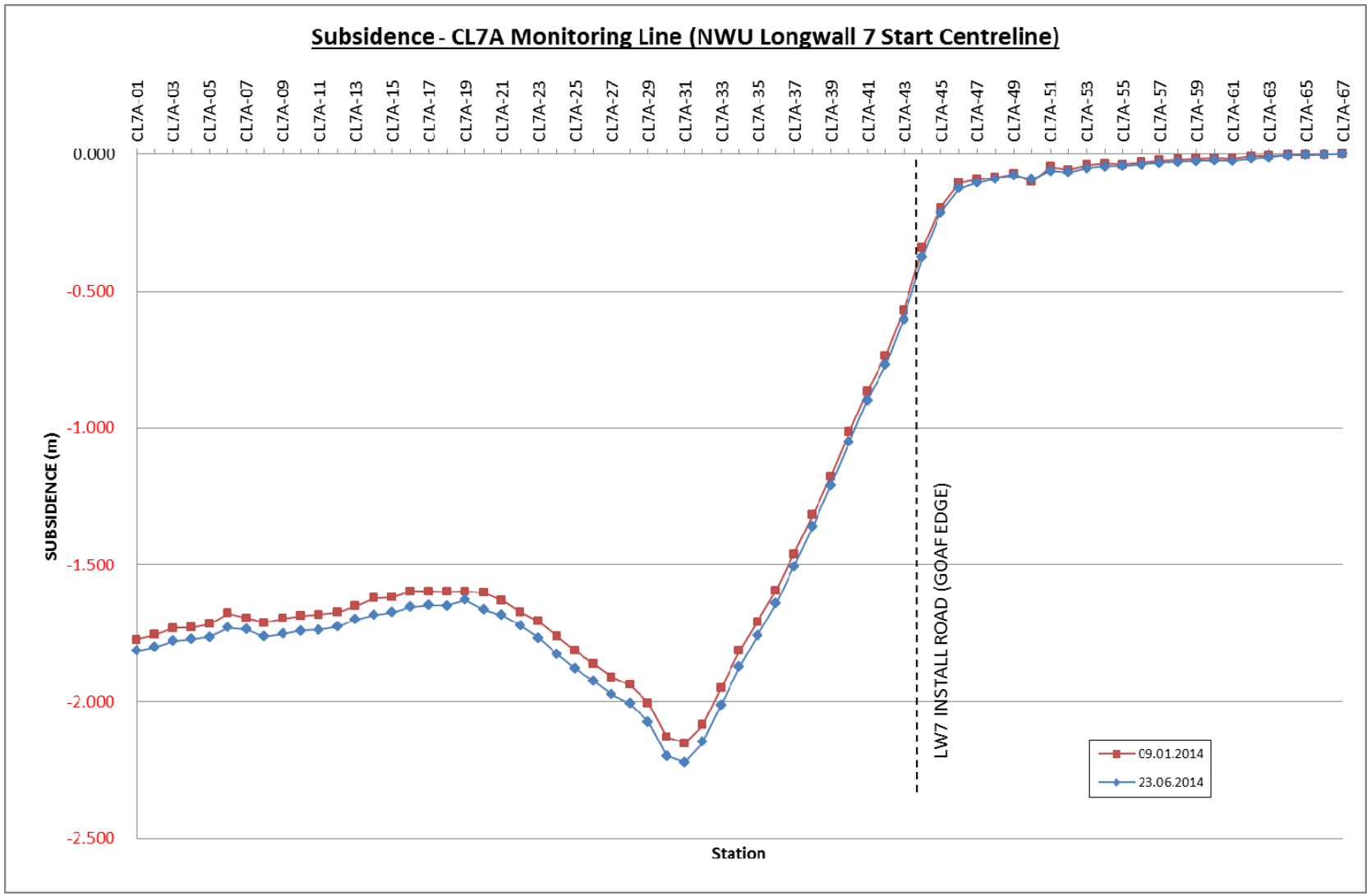


Wambo Coal Pty Ltd
Registered Office
Level 13, BOQ Building
259 Queen Street, Brisbane Qld 4000

ACN 000 668 057
Postal Address
PMB 1
Singleton NSW 2330

Tel +61 (0) 2 6570 2200
Fax +61 (0) 2 6570 2290
www.peabodyenergy.com.au

Figure 3 Subsidence Profile for Monitoring Line CL7A

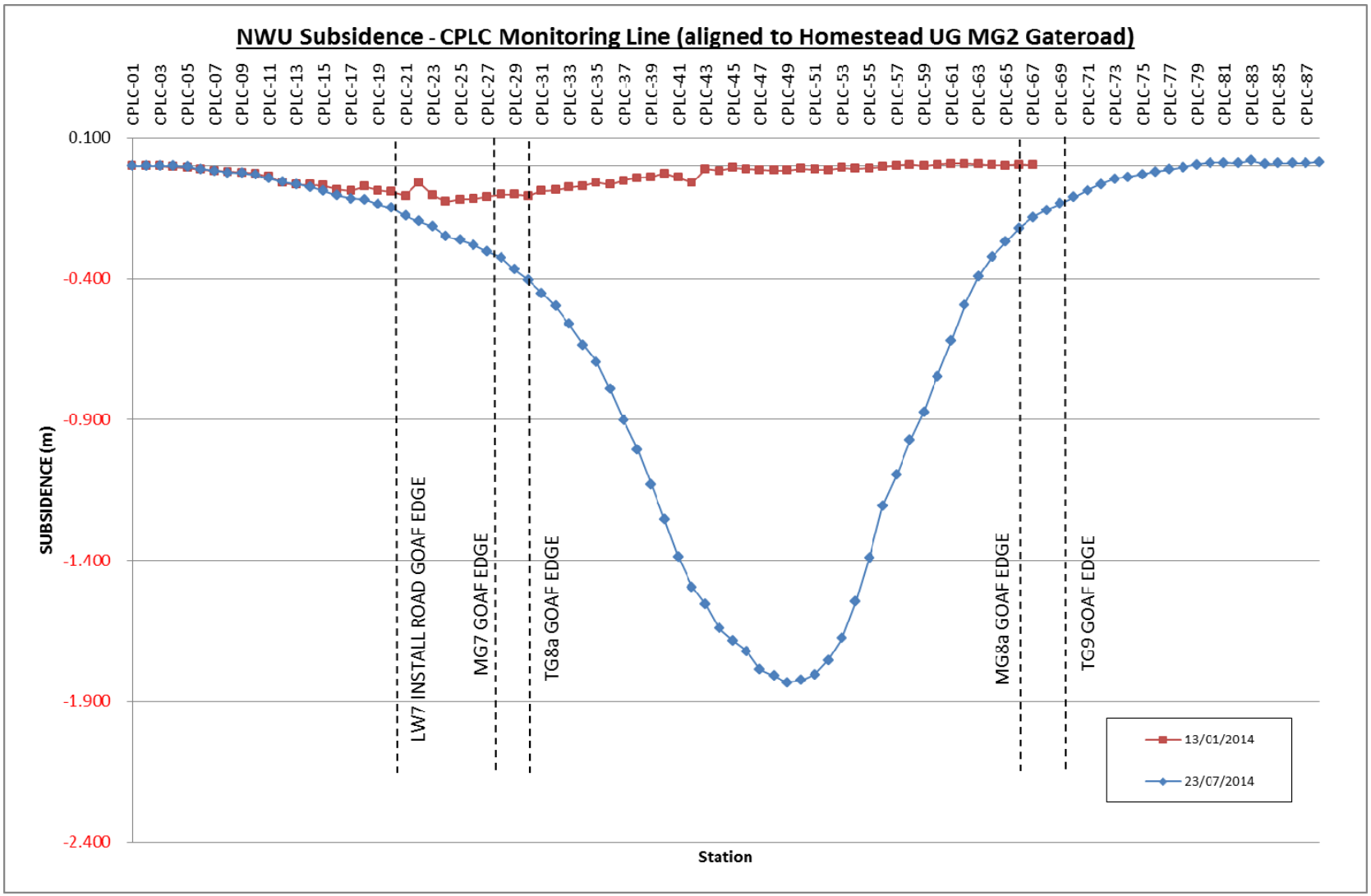


Wambo Coal Pty Ltd
Registered Office
Level 13, BOQ Building
259 Queen Street, Brisbane Qld 4000

ACN 000 668 057
Postal Address
PMB 1
Singleton NSW 2330

Tel +61 (0) 2 6570 2200
Fax +61 (0) 2 6570 2290
www.peabodyenergy.com.au

Figure 4 Subsidence Profile for Monitoring Line CPLC

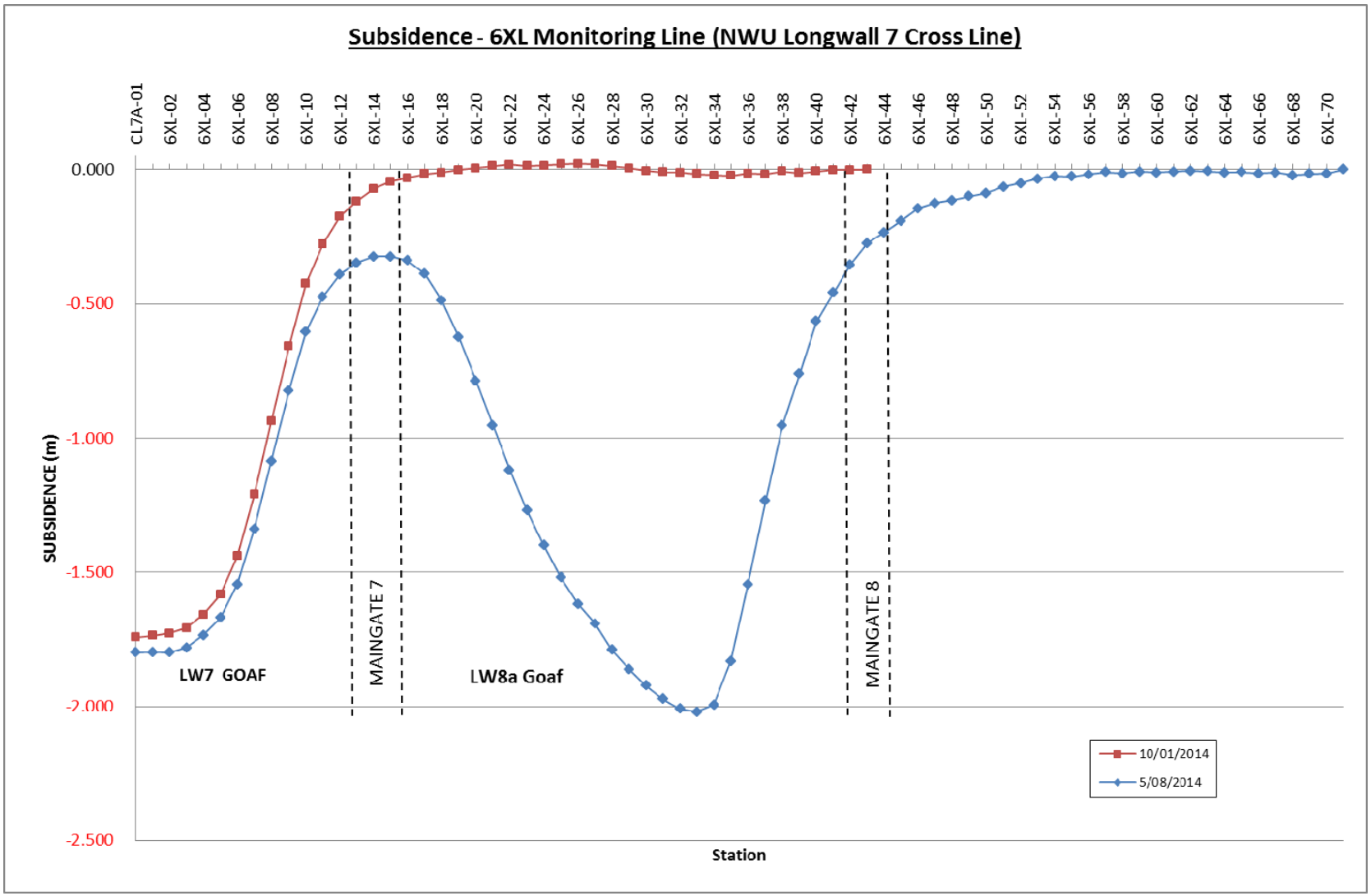


Wambo Coal Pty Ltd
Registered Office
Level 13, BOQ Building
259 Queen Street, Brisbane Qld 4000

ACN 000 668 057
Postal Address
PMB 1
Singleton NSW 2330

Tel +61 (0) 2 6570 2200
Fax +61 (0) 2 6570 2290
www.peabodyenergy.com.au

Figure 5 Subsidence Profile for Monitoring Line 6XL

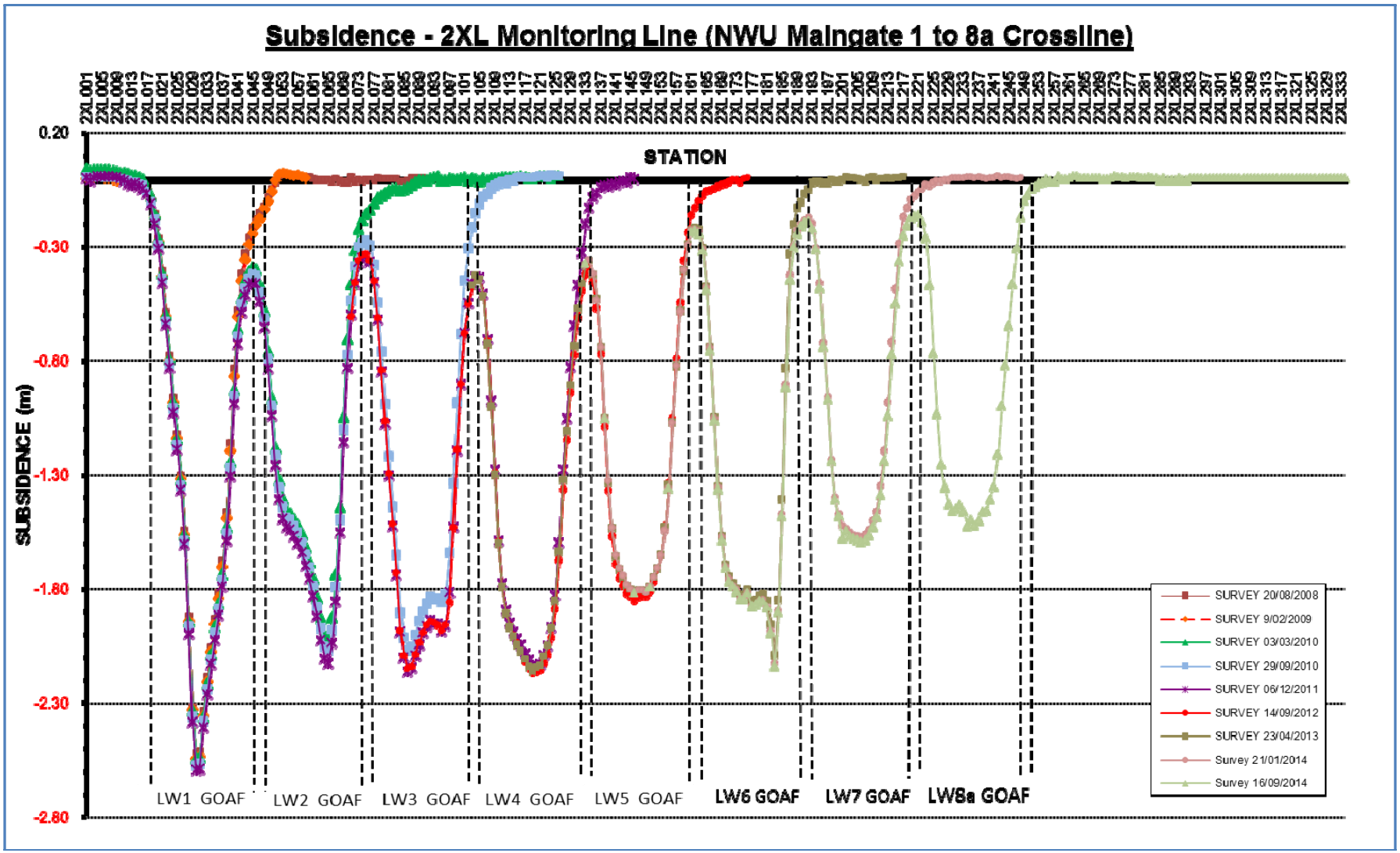


Wambo Coal Pty Ltd
Registered Office
Level 13, BOQ Building
259 Queen Street, Brisbane Qld 4000

ACN 000 668 057
Postal Address
PMB 1
Singleton NSW 2330

Tel +61 (0) 2 6570 2200
Fax +61 (0) 2 6570 2290
www.peabodyenergy.com.au

Figure 6 Subsidence Profile for Monitoring Line 2XL



Wambo Coal Pty Ltd
Registered Office
Level 13, BOQ Building
259 Queen Street, Brisbane Qld 4000

ACN 000 668 057
Postal Address
PMB 1
Singleton NSW 2330

Tel +61 (0) 2 6570 2200
Fax +61 (0) 2 6570 2290
www.peabodyenergy.com.au

ATTACHMENT 4

LONGWALL 7 END OF PANEL REPORT

EXTRACTION PLAN LW7 – LW10

END OF PANEL REPORT LW7

Peabody Energy

Wambo Coal Pty Ltd

Contents

1.0 Introduction 5

1.1 Background 5

1.2 Subsidence Monitoring 5

2.0 Results 9

2.1 Subsidence Monitoring 9

2.2 Ground Water Monitoring 10

2.3 Ground Water Performance 11

3.0 Surface Water Monitoring 12

3.1 Surface Water Performance 13

4.0 Bed and Bank Stability and Riparian Monitoring 14

5.0 Visual Inspections 14

6.0 Remedial Actions 15

7.0 References 16

FIGURES

FIGURE 1 Regional Location Map……6

FIGURE 2 NWU Subsidence Monitoring Lines Plan……...7

FIGURE 3 NWU Monthly Development Advance and LW Retreat……...8

TABLES

TABLE A-1 Actual vs Predicted Smax values for LW7……10

TABLE A-2 Actual vs Predicted Tmax values for LW7...……10

TABLE 2.0 NWU Groundwater Monitoring Network……..11

TABLE 2.1 NWU Groundwater Trigger Levels……...11

TABLE 2.2 Groundwater Results vs Groundwater Trigger Levels……...12

TABLE 3.0 NWU Surface Water Monitoring Program……...13

TABLE 3.1 NWU Surface Water Trigger Levels……13

TABLE 3.2 Surface Water Results vs Surface Water Trigger Levels……..13

TABLE 4.0 Bank and Bed Stability Monitoring……14

APPENDICES

Appendix A: Subsidence Monitoring LW6

TABLE A-1	Actual vs. Predicted S_{max} values for LW7
TABLE A-2	Actual vs. Predicted T_{max} Values for LW7
FIGURE 1	Subsidence Profile for Monitoring Line CL5A
FIGURE 2	Subsidence Profile for Monitoring Line NWU4XL
FIGURE 3	Subsidence Profile for Monitoring Line NWUXL5
FIGURE 4	Subsidence Profile for Monitoring Line CL7A
FIGURE 5	Subsidence Profile for Monitoring Line CPLC
FIGURE 6	Subsidence Profile for Monitoring Line 6XL
FIGURE 7	Subsidence Profile for Monitoring Line 2XL
FIGURE 8	Subsidence Profile for Monitoring Line 3XL
FIGURE 9	Subsidence Profile for Monitoring Line 1XL
FIGURE 10	Subsidence Profile for Monitoring CL7B
FIGURE 11	Subsidence Profile for Monitoring United 8A
FIGURE 12	Subsidence Profile for Monitoring United T

Appendix B: Groundwater Monitoring LW6

TABLE A	Groundwater Monitoring Results for P5 and P6
TABLE B	Groundwater Monitoring results for P301& P315
TABLE C	Groundwater Monitoring Results for GW08 & GW09
FIGURE 1a	Groundwater Monitoring Graphs for P5
FIGURE 1b	Groundwater Monitoring Graphs for P6
FIGURE 1c	Groundwater Monitoring Graphs for P5 & P6
FIGURE 2a	Groundwater Monitoring Graphs for 301
FIGURE 2b	Groundwater Monitoring Graphs for 315
FIGURE 2c	Groundwater Monitoring Graphs for GW08
FIGURE 2d	Groundwater Monitoring Graphs for GW09

Appendix C: Surface Water Monitoring LW6

TABLE A	Surface water monitoring results for North Wambo Creek
TABLE B	Surface water monitoring results for Stony Creek
FIGURE 3a	Surface water monitoring graphs for North Wambo Creek
FIGURE 3b	Surface water monitoring graphs for Stony Creek

Appendix D: Bed and Bank Stability Monitoring - 2013

1.0 Introduction

1.1 Background

Wambo Coal Pty Limited (WPCL) operates the North Wambo Underground (NWU) under an approved Extraction Plan/Subsidence Management Plan (EP/SMP) for longwalls LW7-LW10. WCPL is located approximately 16km west of Singleton, within the locality of Warkworth (see **Figure 1**). The SMP for second workings was lodged in March 2006 and was approved on the 11 December 2006. A subsequent variation to the approved SMP was lodged on 28 November 2007 and subsequently approved on 7 December 2007 by NSW Department of Trade & Investment - Division of Resources and Energy (DTI-DRE), formally known as the Department of Primary Industries. An Extraction Plan for Longwalls 7 and 8 was approved by the DTI-DRE for Longwall 7 on 16 May 2013 and for Longwall 8 on 24 September 2013. The approved Extraction Plan for Longwalls 7 and 8 has been revised to include the two remaining longwalls within the approved NWU extent (Longwalls 9 and 10) for a consolidated Extraction Plan for Longwalls 7 to 10.

The EP/SMP outlines the proposed management, mitigation, monitoring and reporting of potential subsidence impacts and environmental consequences from the secondary extraction of Longwalls 7 to 10 at the NWU.

In accordance with the requirements of condition 22C of DA 305-7-2003, WCPL have prepared this End of Panel (EoP) report for the recently completed Longwall 7 at the NWU mine.

1.2 Subsidence Monitoring

All land within the SMP for LW7 - LW10 area is owned by WCPL. There are no private dwellings within the SMP area.

Maximum subsidence (Smax) and maximum tilt (Tmax) measurements from twelve monitoring lines (see Figure 2) have been used to validate subsidence predictions made prior to the extraction of LW7 and ensure subsidence impacts are mitigated wherever possible. Other environmental and subsidence monitoring undertaken during LW7 included:

- groundwater monitoring;
- surface water monitoring;
- bed and bank stability monitoring; and
- visual inspections.

This report presents the environmental and subsidence monitoring data collected during LW7 extraction.

Secondary extraction commenced on the 27 May 2013 with longwall retreat completed on the 18 January 2014 (Figure 3).

Figure 1: Regional Location Plan

Figure 2: NWU Subsidence Monitoring Lines Plan

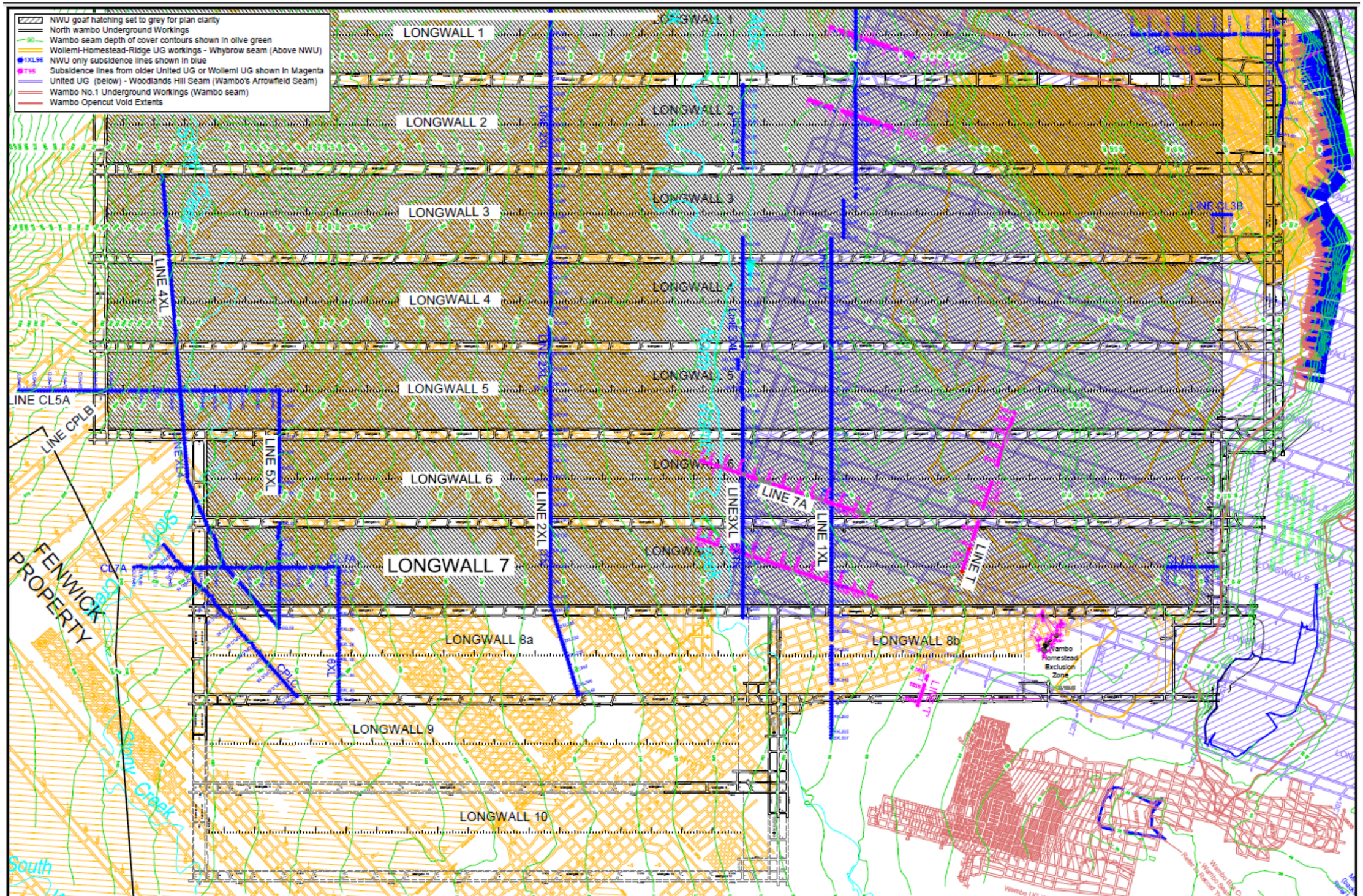
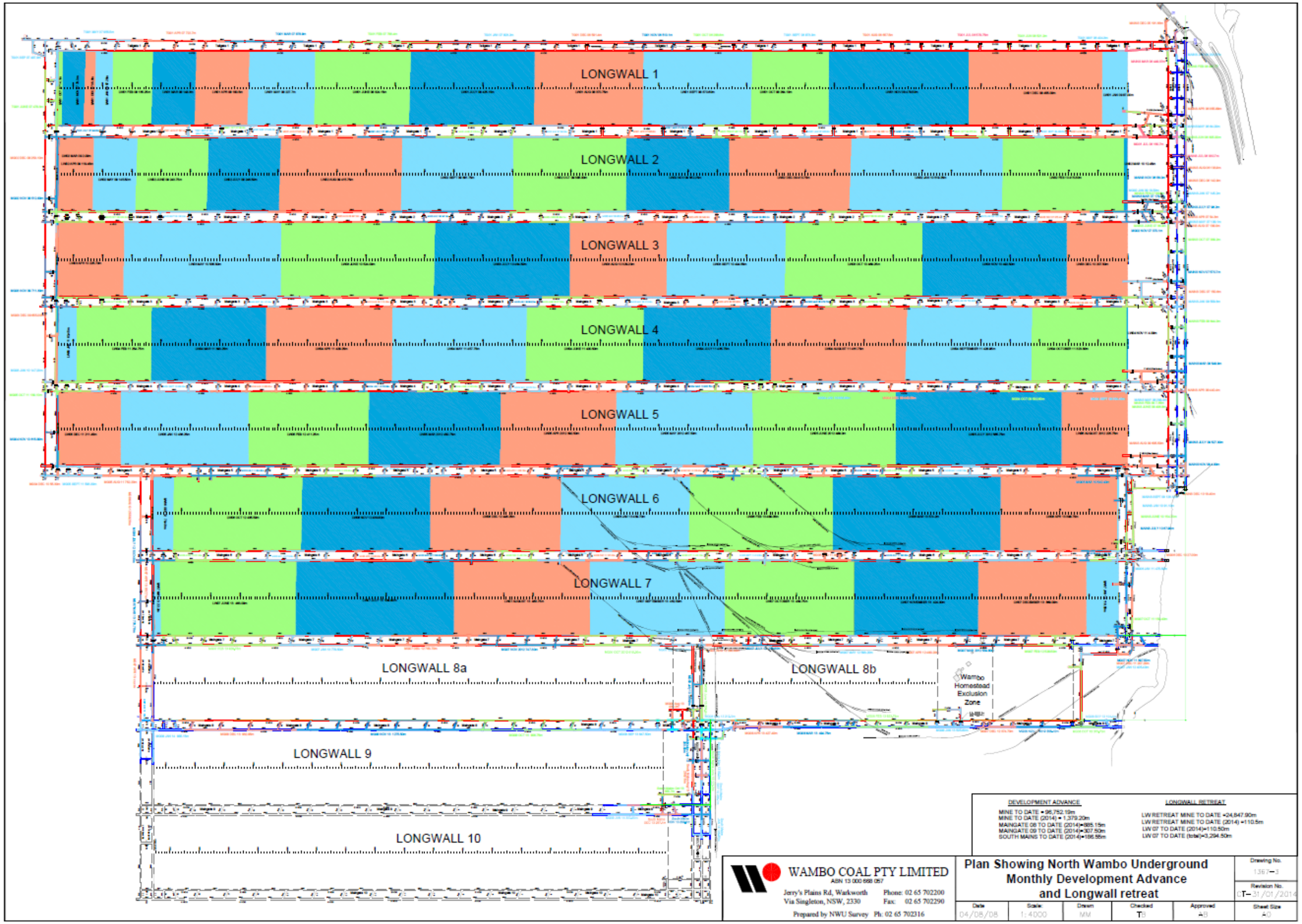


Figure 3: NWU Monthly Development Advance and LW Retreat



2.0 Results

2.1 Subsidence Monitoring

In accordance with Consent Condition 22, Schedule 4 of DA 305-7-2003-i, Wambo Coal Pty Ltd (Wambo) commissioned DgS (Ditton Geotechnical Services Pty Ltd) to conduct a detailed subsidence impact assessment for Longwall Panels 7 and 8 as part of the North Wambo Underground Mine (NWU) Extraction Plan/Subsidence Management Plan (EP/SMP).

Revised subsidence predictions for Longwalls 7 and 8 have been generated using two empirically based prediction models (ACARP, 2003 and SDPS®) and measured subsidence effects at the NWU to-date. A separate report (DgS, 2012a) has been prepared in support of the Extraction Plan/SMP that reviews the measured subsidence at NWU to date and confirms that the prediction methodology is suitable for the prediction of subsidence for NWU LW7 and 8. The revised predictions of subsidence effects have been compared with the Holt 2005 predictions. Actual Smax values measured following extraction of LW07 (Table A-1) fall within the ranges indicated by the SMP.

It should also be noted that the actual Smax values reported (Table A-1) are absolute maximums measured at each chainage. Averaging Smax values across the base of the subsidence trough (for transverse lines) yields lower and potentially more realistic measurements. Subsidence profiles for each of the nine monitoring lines analysed are appended below (Figures A1 – A4).

Maximum tilt (Tmax) values have been calculated for each subsidence monitoring point on the twelve monitoring lines overlying and adjacent to LW7. Although two of the lines exceed the predicted Tmax ranges indicated by the SMP (Table A-2), the values are relatively close to those predicted. Taking into account typical seasonal variations of up to 10 mm/m, only subsidence line CL7B (LW7 end line on old Whybrow seam opencut rehab) indicate a Tmax values that is significantly in excess of the ranges predicted. It is important to note that the predictions for the shallow longwall panels with width to height (w/h) ratios that are >2 are outside the limits of the Strata Engineering database thus introducing some uncertainty to the predictions provided. Whilst the predicted subsidence values are not likely to exceed 0.6 x extraction height, the predictions of tilt and strain could be significantly greater or less than the values indicated (Strata Engineering, 2006).

Observations and measurements following extraction of LW7 are generally consistent with those from LW1 – LW6 and largely fit within the predicted ranges indicated by the SFM. The two values that fall outside the predicted ranges can likely be attributed to typical seasonal variations, shallow workings, old opencut rehab, previously subsided ground by United Colliery and or panel geometries that fall outside the Strata Engineering database.

Table A-1 Actual vs. Predicted Smax values for LW7

Monitoring Line ID	Monitoring Point ID	Actual Chainage of Monitoring Line	Depth of Cover (m)	Predicted Smax (m)	Actual Smax (m)	Difference (m)	Within Predicted Range
CL5A	CL5A-02	0-560	222-292	1.75 – 3.31	2.39	-0.92	√
NWU4XL	XL4-135	0-561	230-395	2.15	1.60	-0.55	√
NWU5XL	NWUXL528	234	222-243	1.76	1.60	-0.16	√
CL7A	CL7A-31	0-430	209-237	1.75 – 3.31	2.15	-1.16	√
CPLC	CPLC-24	0-141	202-230	1.75 – 3.31	0.13	-3.18	√
6XL	6XL-01	430	194-209	1.75 – 3.31	1.74	-1.57	√
NWU2XL	2XL-183	1125	150-180	1.88	1.58	-0.31	√
NWU3XL	3XL-208	1754	100-120	1.88	1.75	-0.14	√
NWU1XL	1XL-183	2044	75-100	1.76	1.52	-0.24	√
CL7B	CL7B1-18	3146-3313	60-70	1.75 – 3.31	2.13	-1.18	√
United 8A*	8A30	1605-2124	91-113	1.75 – 3.31	2.86	-0.45	√
United T*	T168	2472-2546	60-65	1.75 – 3.31	3.01	-0.30	√

*Multi seam

Table A-2 Actual vs. Predicted Tmax values for LW7

Monitoring Line ID	Monitoring Point ID	Actual Chainage of Monitoring Line	Depth of Cover (m)	Predicted Tmax (mm/m)	Actual Tmax (mm/m)	Difference (mm/m)	Within Predicted Range
CL5A	CL5A-02	0-560	222-292	24 - 31	13.80	-57.2	√
NWU4XL	XL4-135	0-561	230-395	31	5.20	-30.8	√
NWU5XL	NWUXL528	234	222-243	31	17.60	-6.4	√
CL7A	CL7A-31	0-430	209-237	24 - 31	22.90	-48.1	√
CPLC	CPLC-24	0-141	202-230	24 - 28	5.00	-66.0	√
6XL	6XL-01	430	194-209	24 - 21	28.30	-42.7	√
NWU2XL	2XL-183	1125	150-180	31	55.10	-26.9	√
NWUXL3	3XL-208	2080	100-120	29	43.5	-52.5	√
NWUXL1	1XL-183	2410	75-100	3.1	61.6	12.6	x
CL7B	CL7B1-18	3146-3313	60-70	24 - 3.1	75.70	4.7	x
United 8A*	8A30	1605-2124	91-113	24 - 3.1	16.10	-54.9	√
United T*	T168	2472-2546	60-65	24 - 58	66.60	-4.4	√

*Multi seam

2.2 Ground Water Monitoring

Groundwater monitoring is undertaken in the areas of North Wambo Creek and Stony Creek to identify potential changes to groundwater systems affected by subsidence, in accordance with WCPL Water Management Plan – North Wambo Underground Mine Longwalls 7 -10 (February 2014) Groundwater

Monitoring Program (GWMP) within the EP/SMP. Monitoring groundwater water levels, pH and electrical conductivity (EC) is carried out utilising piezometers above NWU mine workings (see **Table 2.0**) to identify whether subsidence impacts on groundwater are comparable to predictions made in the EP/SMP. The results from the groundwater monitoring program are compared against their respective groundwater trigger levels as identified in the GWMP (see **Table 2.1**).

Table 2.0 NWU Groundwater Monitoring Network

Area	Groundwater Monitoring Site	Total Depth (m)	Aquifer
Central Stony Creek	P301	37	Alluvium/Whybrow Interburden
	P315	8.6	Stony Creek Alluvium
North Wambo Creek	GW08	7	North Wambo Creek Alluvium
	GW09	7.1	North Wambo Creek Alluvium
	P5	11.5	North Wambo Creek Alluvium
	P6	11.5	North Wambo Creek Alluvium

Table 2.1 NWU Groundwater Trigger Levels

Groundwater Monitoring Site	Depth to Groundwater Level		pH		Electrical Conductivity	
	Min WL (mbGL)	Max WL (mbGL)	Min pH	Max pH	Min EC (µS/cm)	Max EC (µS/cm)
P301	8.77	15.98	6.0	9.5	8,500	10,000
P315	2.26	11.90	6.0	9.5	250	600
GW08	1.17	3.80	6.0	9.5	1,500	2,500
GW09	2.02	2.68	6.0	9.5	1,500	1,800
P5	0.76	7.74	6.0	9.5	750	5,250
P6	1.58	6.47	6.0	9.5	1,500	3,500

2.3 **Ground Water Performance**

Sampling at monitoring locations P5 and P6 was accordance with the North Wambo Creek Subsidence Response Strategy, monitoring at GW08, GW09, P301 and P315 was undertaken on a bi-monthly basis in accordance with the GWMP. For further monitoring results regarding groundwater monitoring please refer to **Appendix B**.

Figure 1a and **Figure 1b** (see **Appendix B**) displays the relationship between depth to groundwater monitored for both P5 and P6 and recorded rainfall. Depth to groundwater levels demonstrated a recovery after rainfall events. A summary of groundwater monitoring results during the extraction of LW7 was compared against their relevant groundwater trigger levels are provided below.

Table 2.2 Groundwater Results vs Groundwater Trigger Levels

Monitoring Piezometers	Depth to Groundwater (m)	pH	EC (uS/cm)
P315 & P301	P315 remained within the trigger levels for depth to groundwater during LW7 extraction. P301 remained within trigger levels for the exception of one sampling event during the extraction period.	Both P301 and P315 remained within their pH groundwater trigger levels during LW7 extraction.	P315 remained within the EC groundwater trigger levels during LW7 extraction. P301 EC groundwater results were below the minimum trigger level for the period of LW7 extraction. Monitoring records show P301 groundwater results have been below the minimum trigger level since April 2007.
GW08 & GW09	GW08 and GW09 depth to ground water results were outside their respective trigger levels during LW7 extraction. Monitoring records show that GW08 and GW09 have remained outside trigger level since October 2012 and August 2006 respectively.	Both GW08 and GW09 remained within pH groundwater trigger levels during the extraction of LW7.	GW08 remained within the EC trigger level criteria during the extraction of LW7. GW09 results were outside EC trigger levels during the extraction period. GW09 has been outside the EC trigger levels since November 2009.
P5^ & P6* ^P5 was decommissioned due to open cut mining operations in March 2014. *P6 was decommissioned due to open cut mining progression in October 2013.	Both P5 and P6 were outside their respective depth to groundwater trigger levels during the extraction of LW7. Monitoring records show that P5 and P6 have consistently remained outside trigger levels since May 2012 and June 2012 respectively. P6 was decommissioned during the extraction of LW7.	P5 and P6 remained within the pH groundwater trigger levels during the extraction of LW7. P6 was decommissioned during the extraction of LW7.	P5 EC values were consistently outside the trigger levels during the extraction of LW7. P6 EC values were outside the trigger values during the extraction of LW7. Monitoring records show that P5 EC results have been outside trigger values since May 2012 and P6 values have been outside trigger values since April 2009. P6 was decommissioned during the extraction of LW7.

3.0 Surface Water Monitoring

Surface water monitoring in the areas of North Wambo Creek and Stony Creek potentially affected by subsidence from NWU is undertaken in accordance with WCPL Surface Water Monitoring Program (SWMP) within Volume 2 of the SMP. Water flows, pH, EC, Total Dissolved Solids (TDS) and Total Suspended Solids (TSS) are monitored within the previously mentioned waterways (see **Table 3.0**). To identify whether subsidence impacts on surface waters are comparable to predictions made in the SMP, the results are compared against their respective surface water trigger levels as identified in the SWMP (see **Table 3.1**).

Table 3.0 NWU Surface Water Monitoring Program

Monitoring Point ID	Parameters Monitored	Frequency	Purpose
SW04, SW27, SW32, SW05	pH, EC, TDS, TSS	• Monthly • Following significant rainfall events (>20mm in 24hrs)	Monitoring of water quality of North Wambo Creek
SW07, SW08	pH, EC, TDS, TSS	• Monthly • Following significant rainfall events (>20mm in 24hrs)	Monitoring of water quality of Stony Creek
FM1	Surface water flow	Continuous	Monitoring of flow in North Wambo Creek upstream of diversion
FM2	Surface water flow	Continuous	Monitoring of midstream flow of North Wambo Creek Diversion
FM3	Surface water flow	Continuous	Monitoring of flow at the end of North Wambo Creek Diversion
FM4	Surface water flow	Continuous	Monitoring of flow in North Wambo Creek / Wollombi Brook confluence
FM7	Surface water flow	Continuous	Monitoring of flow in Stony Creek downstream
FM8	Surface water flow	Continuous	Monitoring of flow in Stony Creek upstream

Table 3.1 NWU Surface Water Trigger Levels

Stream System	pH Criteria	EC Criteria (µS/cm)	TSS Criteria (mg/L)
North Wambo Creek	6.5 - 9.5	2,093	120
Stony Creek	6.5 - 9.5	492	120

3.1 Surface Water Performance

Presented below (Table 3.2) is a summary of the surface water monitoring results during the extraction of LW7, compared against their relevant surface water criteria trigger levels. Please note that due to the ephemeral nature of the creeks, water samples for analysis are not always available at the time of the monthly sampling.

For further monitoring results regarding surface water monitoring please refer to **Appendix C**.

Table 3.2 Surface Water Results vs Surface Water Trigger Levels

Surface Water Monitoring Sites	pH	EC (uS/cm)	TSS (mg/L)
SW04, SW27, SW32 & SW05	Sites SW05, SW27 and SW32 were within the pH surface water criteria during LW7 extraction. There were no sampling results for SW04 during the extraction period.	Sites SW05, SW27 and SW32 were within their respective EC surface water criteria during LW7 extraction. There were no sampling results for SW04 during the extraction period.	TSS readings for sites SW27 and SW32 were consistently outside trigger levels during the extraction period. Results for SW05 were within trigger levels with the exception of one sampling event. There were no sampling results for SW04 during the extraction period.
SW07 & SW08	SW07 and SW08 were within pH surface water criteria during the extraction of LW7.	SW07 results were consistently outside the trigger level during LW7 extraction.	SW07 and SW08 were within TSS trigger levels during the extraction of LW7.

Surface Water Monitoring Sites	pH	EC (uS/cm)	TSS (mg/L)
		SW08 remained within trigger levels during the extraction period.	

4.0 Bed and Bank Stability and Riparian Monitoring

The Baseline Riparian Vegetation and Bed Bank Stability Monitoring Program commenced in October 2006 to monitor for potential subsidence impacts. The program aims to distinguish natural erosion from mine subsidence associated instability, through pre-mining and post-mining survey mapping in North Wambo Creek, South Wambo Creek and Stony Creeks. The details of the bank and bed stability monitoring program applicable to NWU are displayed in **Table 4.0** below. The 2013 report is attached in Appendix D.

Table 4.0 Bank and Bed Stability Monitoring

Name of Creek	Timing of Initial Survey	Cross Sections	Long Sections	Frequency
North Wambo Creek	Prior to longwall mining in the North Wambo Underground Mine	15 transects would be surveyed at selected locations ranging from immediately upstream to downstream of the ultimate subsidence zone of the North Wambo Underground Mine	A long section will be surveyed along the creek alignment across the portion of the creek subsided	Annually
Stony Creek	Prior to longwall mining in the North Wambo Underground Mine	5 transects would be surveyed at selected locations ranging from immediately upstream to downstream of the ultimate subsidence zone of the North Wambo Underground Mine	A long section will be surveyed along the creek alignment across the portion of the creek subsided	Annually

5.0 Visual Inspections

All subsidence impacts within the SMP area for NWU occur on WCPL owned land. Visual observations for subsidence related impacts on the surface were undertaken.

Visual inspections and photographic recordings along each panel after mining were also undertaken by WCPL Survey Department. The SMP predicted surface cracking widths from 40mm to 430mm. Surface cracking widths recoded above LW7 were generally consistent with the predictions made in the SMP (see photos below).

Dewatering Bore 4a

Dewatering boreholes 4a Access Track

Maingate 7 – Surface Cracking

Maingate 7 Surface/Step Cracking – Wollemi Access Road

6.0 Remedial Actions

Remedial actions regarding subsidence impacts on the surface are assessed and where necessary remediated through the implementation of one or more of the following mitigation measures including filling of minor cracks with gravel and road base material to repair internal access tracks. Detailed remedial actions undertaken during the course of the calendar year are reported in the Annual Environmental Management Report (AEMR).

Due to the significant amount of established or and mature vegetation overlaying the NWU mine with a large proportion being located within the approved biodiversity offset areas of WCPL. Appropriate subsidence related remedial actions need to be made in the context of an increase potential disturbance to this protected habitat.

7.0 References

North Wambo Underground Mine - Extraction Plan Longwalls 7 to 10, prepared by Wambo Coal Pty Ltd and Resource Strategies Pty Ltd, February 2014.

Revised Predictions of Subsidence Effects and Subsidence Impacts for Longwalls 7 and 8 at North Wambo Underground Mine, (Ditton Geotechnical Services) DgS Report No. NWU-001/6 25/11/2012.

Strata Engineering Australia Pty Ltd, 2006. Subsidence Impact Assessment for LWs 1 to 6 at the Proposed North Wambo Mine, Prepared For Wambo Coal Pty Ltd, February 24, 2006.

Wambo Coal Pty Ltd, 2006. North Wambo Underground Mine Subsidence Management Plan, March, 2006.

Wambo Development Project, Environmental Impact Statement (July 2003), prepared by Resource Strategies Pty Ltd.

APPENDIX A: SUBSIDENCE MONITORING RESULTS – LW7

Table A-1 Actual vs. Predicted Smax values for LW7

Monitoring Line ID	Monitoring Point ID	Actual Chainage of Monitoring Line	Depth of Cover (m)	Predicted Smax (m)	Actual Smax (m)	Difference (m)	Within Predicted Range
CL5A	CL5A-02	0-560	222-292	1.75 - 3.31	2.39	-0.92	√
NWU4XL	XL4-135	0-561	230-395	2.15	1.60	-0.55	√
NWU5XL	NWUXL528	234	222-243	1.76	1.60	-0.16	√
CL7A	CL7A-31	0-430	209-237	1.75 - 3.31	2.15	-1.16	√
CPLC	CPLC-24	0-141	202-230	1.75 - 3.31	0.13	-3.18	√
6XL	6XL-01	430	194-209	1.75 - 3.31	1.74	-1.57	√
NWU2XL	2XL-183	1125	150-180	1.88	1.58	-0.31	√
NWU3XL	3XL-208	1754	100-120	1.88	1.75	-0.14	√
NWU1XL	1XL-183	2044	75-100	1.76	1.52	-0.24	√
CL7B	CL7B1-18	3146-3313	60-70	1.75 - 3.31	2.13	-1.18	√
United 8A*	8A30	1605-2124	91-113	1.75 - 3.31	2.86	-0.45	√
United T*	T168	2472-2546	60-65	1.75 - 3.31	3.01	-0.30	√

Table A-2 Actual vs. Predicted Tmax values for LW7

Monitoring Line ID	Monitoring Point ID	Actual Chainage of Monitoring Line	Depth of Cover (m)	Predicted Tmax (mm/m)	Actual Tmax (mm/m)	Difference (mm/m)	Within Predicted Range
CL5A	CL5A-02	0-560	222-292	24 - 31	13.80	-57.2	√
NWU4XL	XL4-135	0-561	230-395	31	5.20	-30.8	√
NWU5XL	NWUXL528	234	222-243	31	17.60	-6.4	√
CL7A	CL7A-31	0-430	209-237	24 - 31	22.90	-48.1	√
CPLC	CPLC-24	0-141	202-230	24 - 28	5.00	-66.0	√
6XL	6XL-01	430	194-209	24 - 21	28.30	-42.7	√
NWU2XL	2XL-183	1125	150-180	31	55.10	-26.9	√
NWUXL3	3XL-208	2080	100-120	29	43.5	-52.5	√
NWUXL1	1XL-183	2410	75-100	3.1	61.6	12.6	x
CL7B	CL7B1-18	3146-3313	60-70	24 - 3.1	75.70	4.7	x
United 8A*	8A30	1605-2124	91-113	24 - 3.1	16.10	-54.9	√
United T*	T168	2472-2546	60-65	24 - 58	66.60	-4.4	√

Figure 1 Subsidence Profile for Monitoring Line CL5A

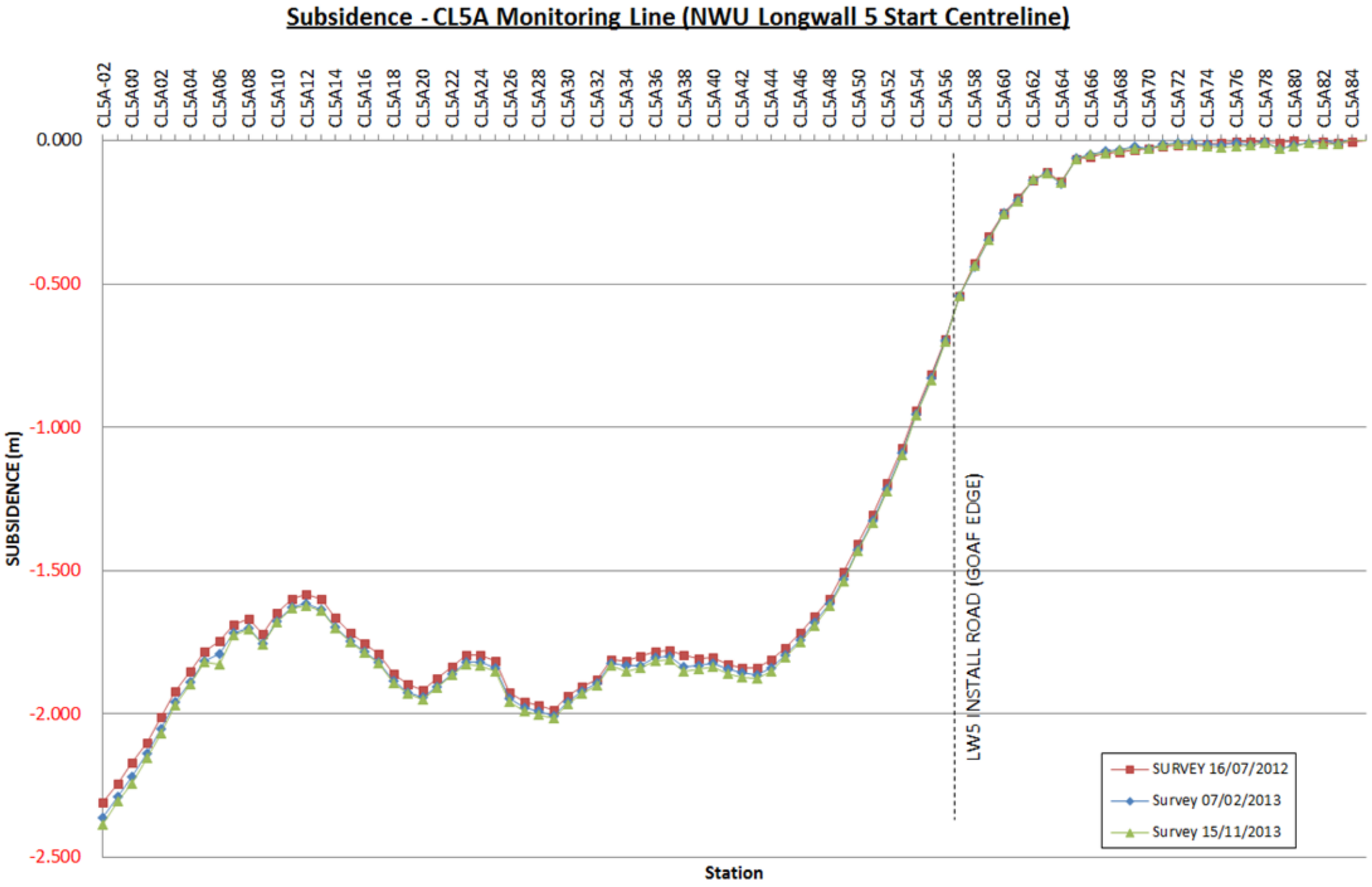


Figure 2 Subsidence Profile for Monitoring Line NWU4XL

Subsidence - 4XL Monitoring Line (NWU Longwall 3 to 7 Crossline)

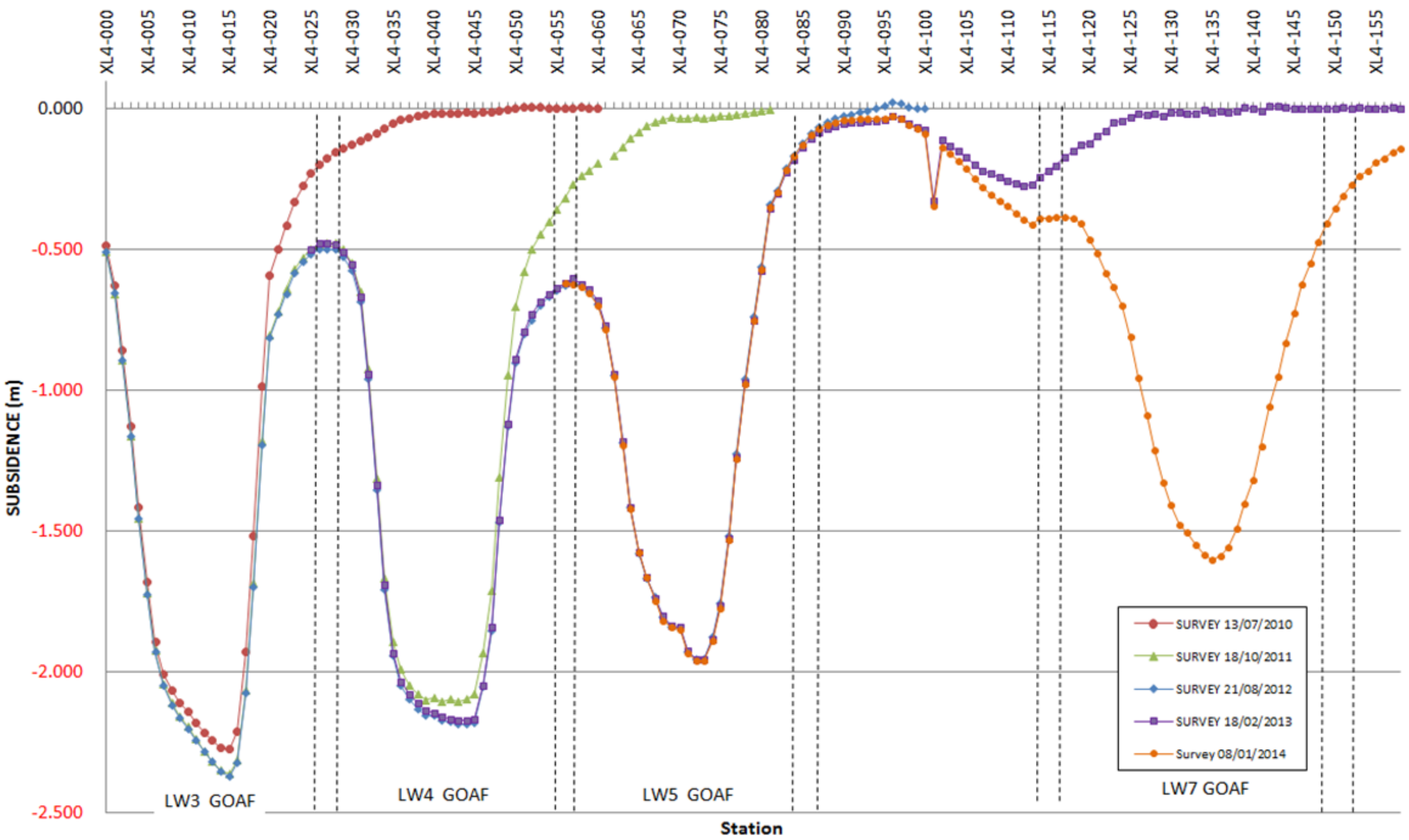


Figure 3 Subsidence Profile for Monitoring Line XL5

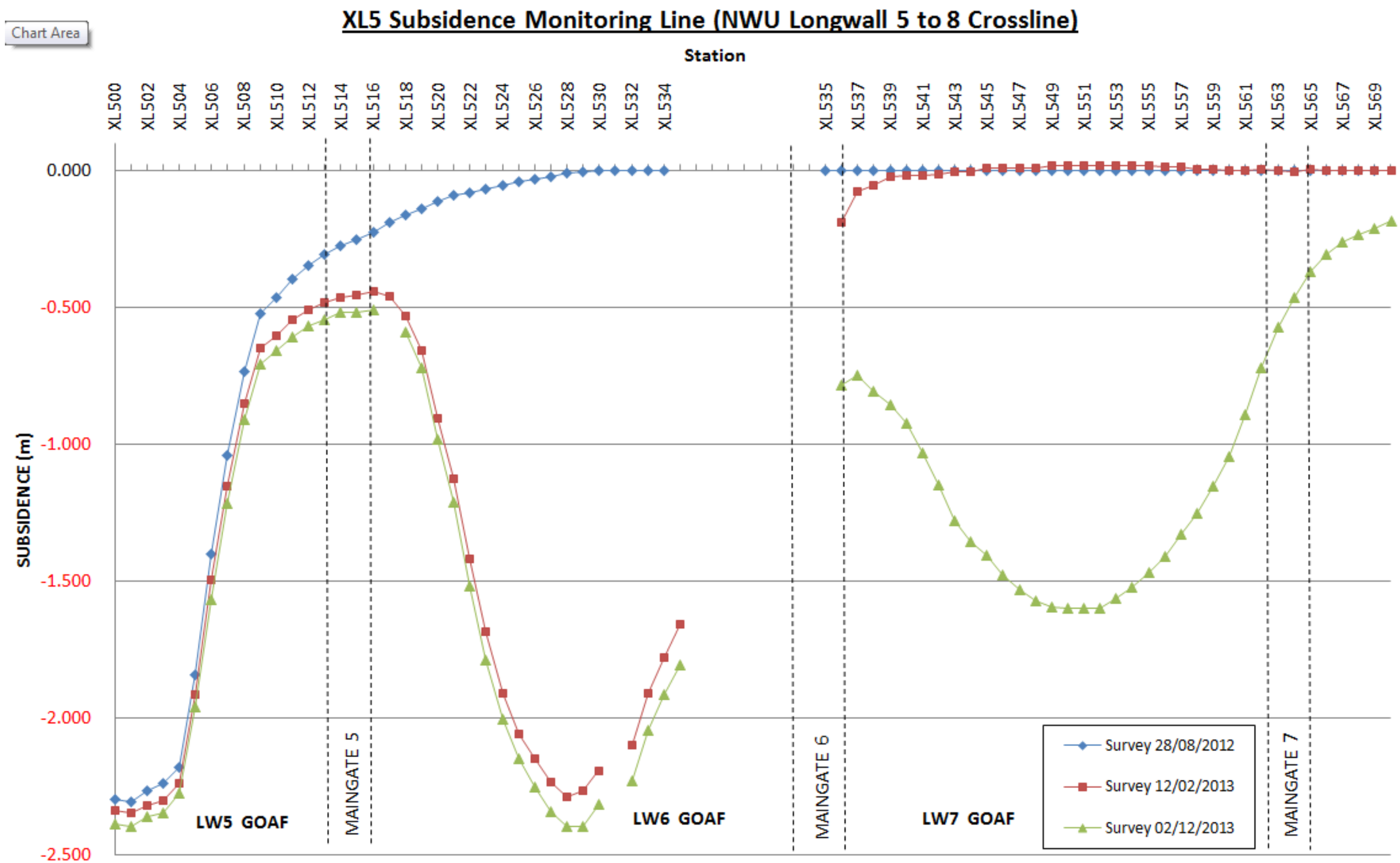


Figure 4 Subsidence Profile for Monitoring Line CL7A

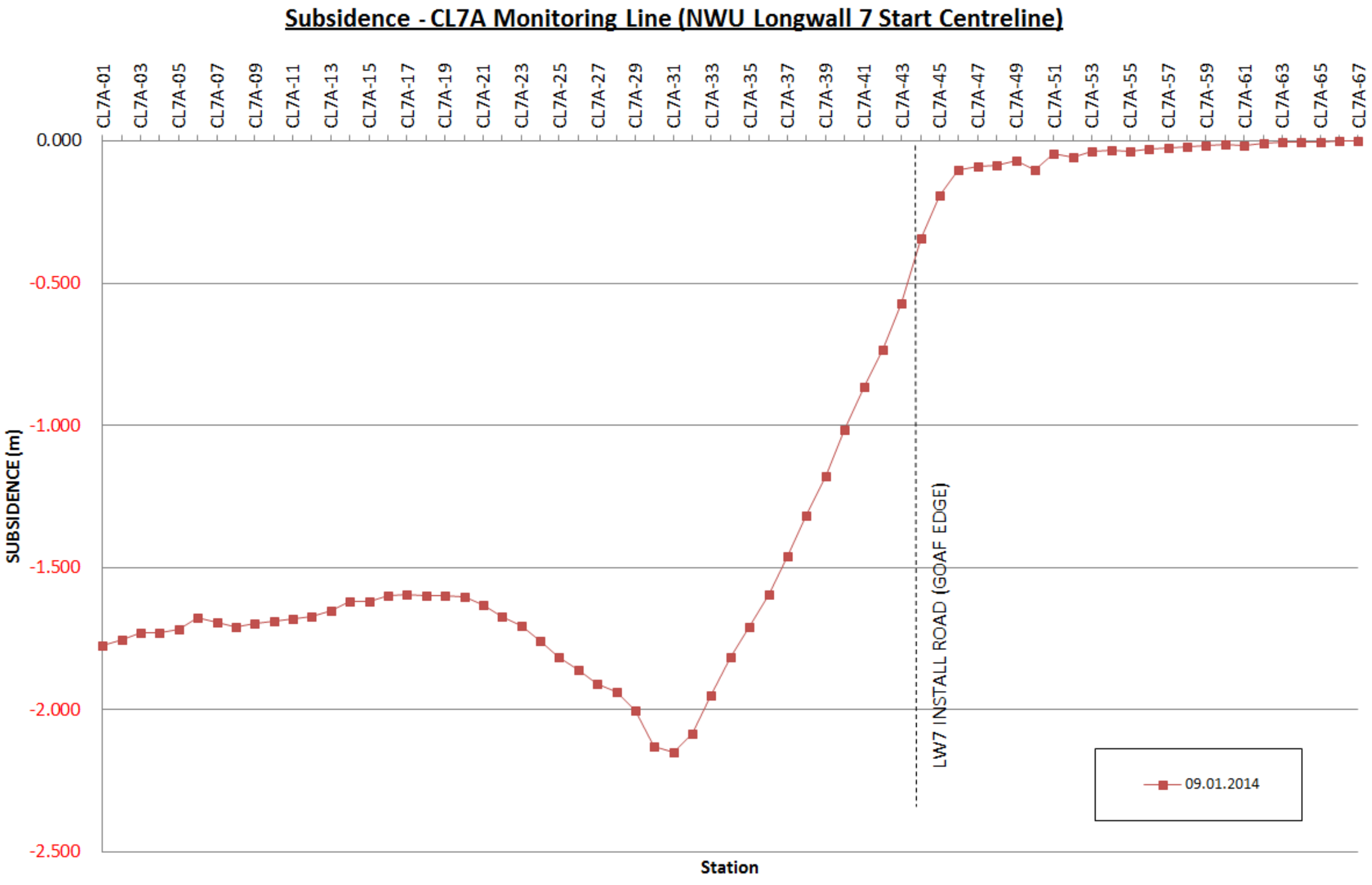


Figure 5 Subsidence Profile for Monitoring Line CPLC

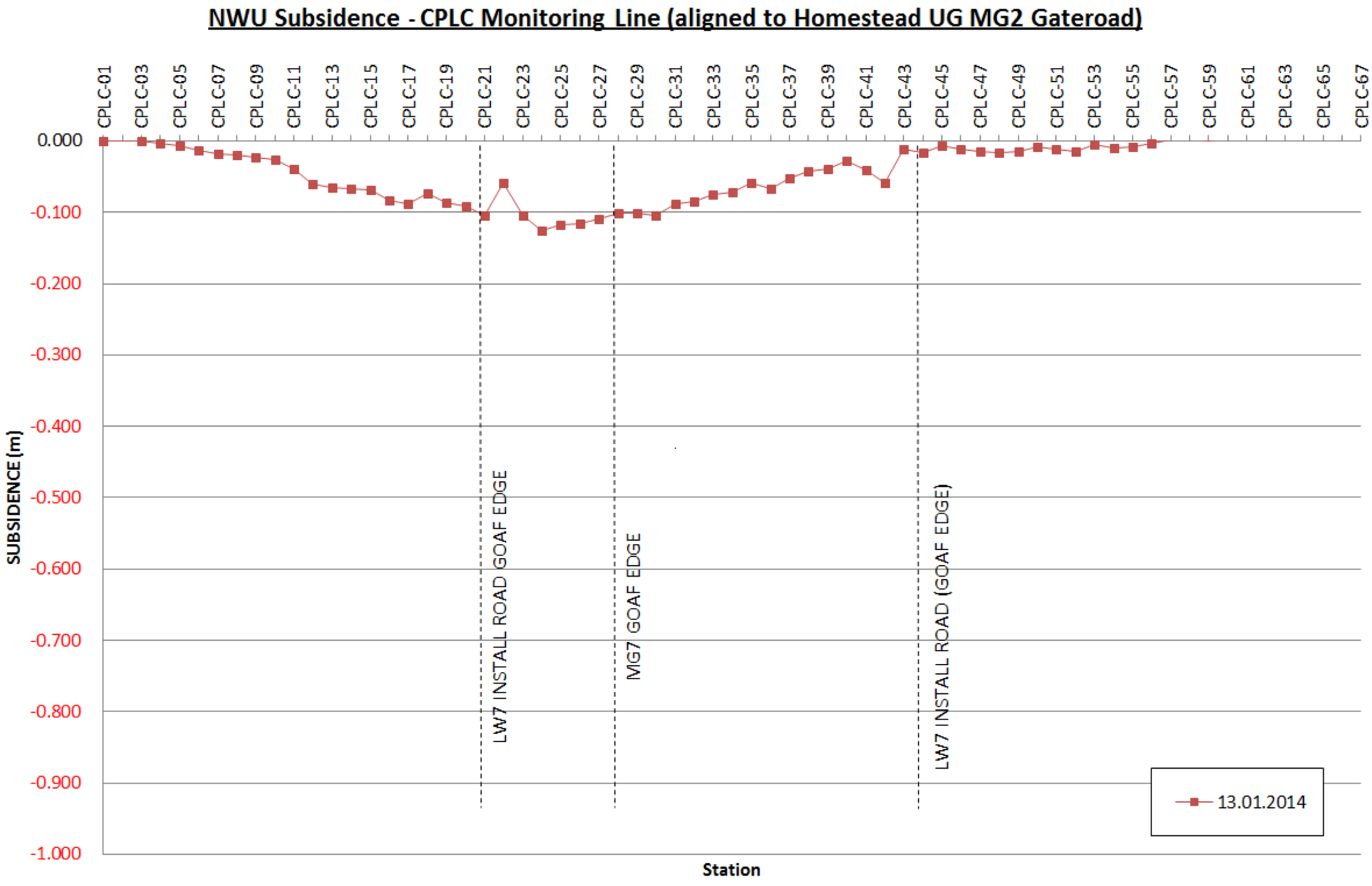


Figure 6 Subsidence Profile for Monitoring Line 6XL

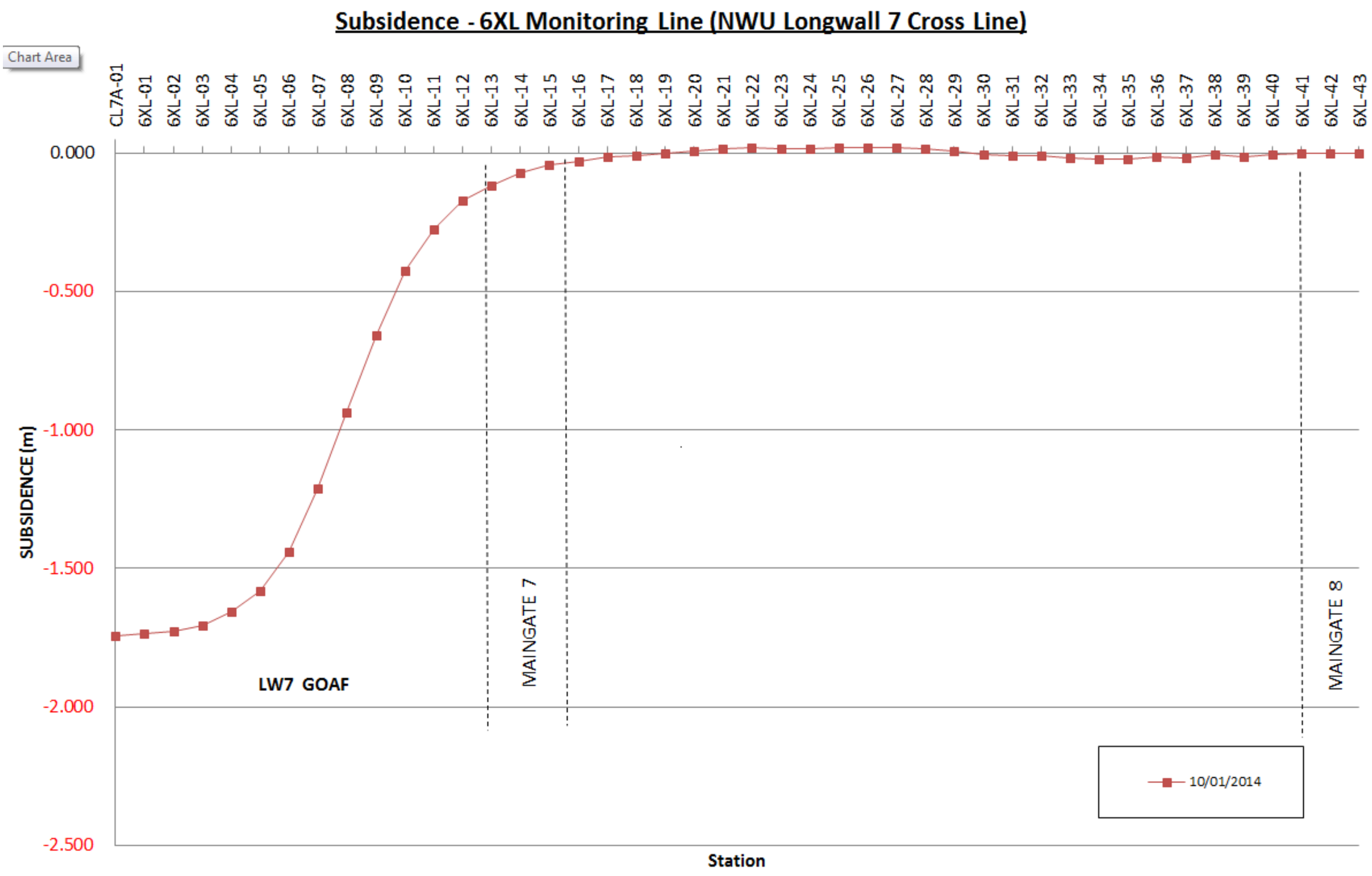


Figure 7 Subsidence Profile for Monitoring Line NWUXL2

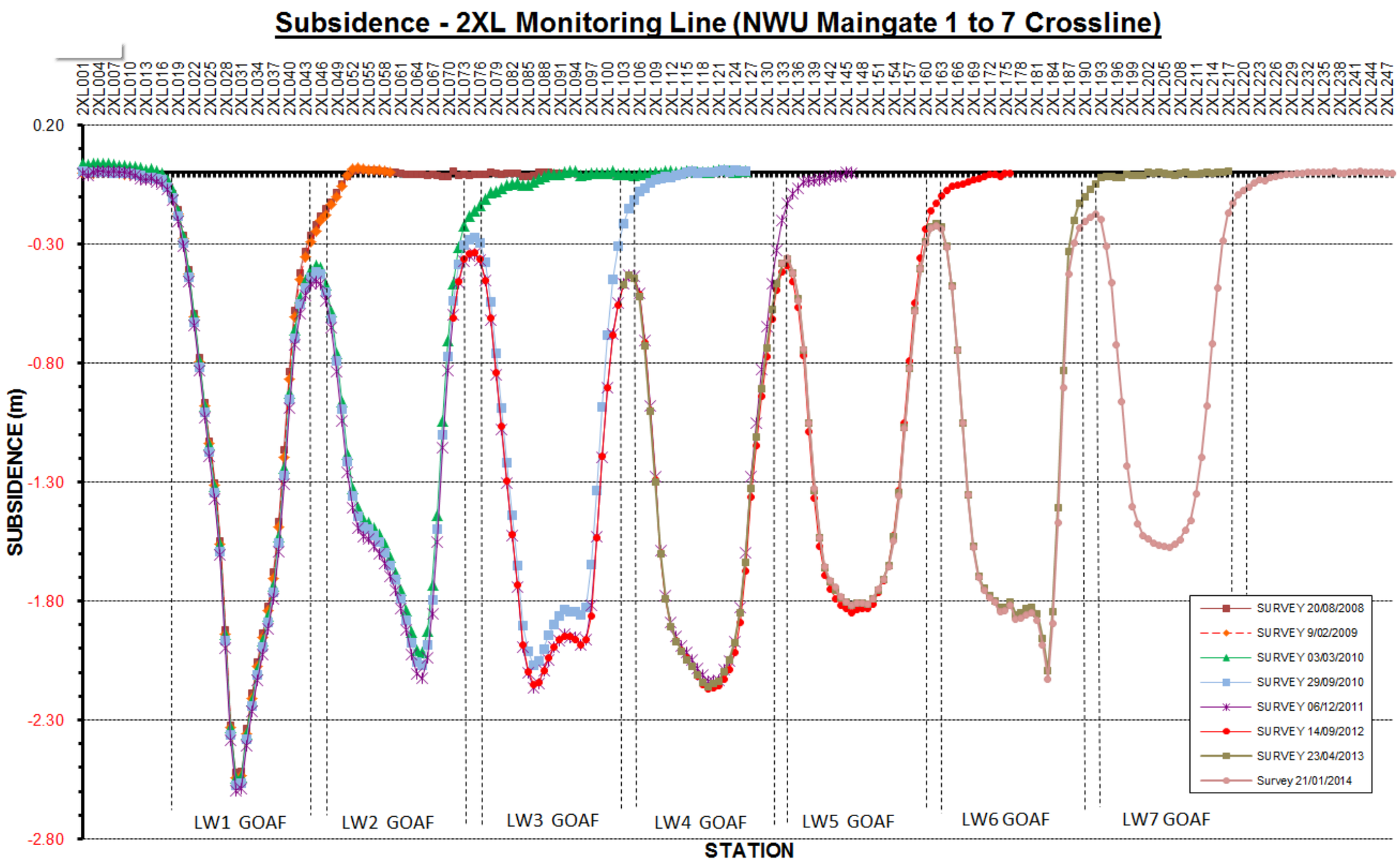


Figure 8 Subsidence Profile for Monitoring Line NWUXL3

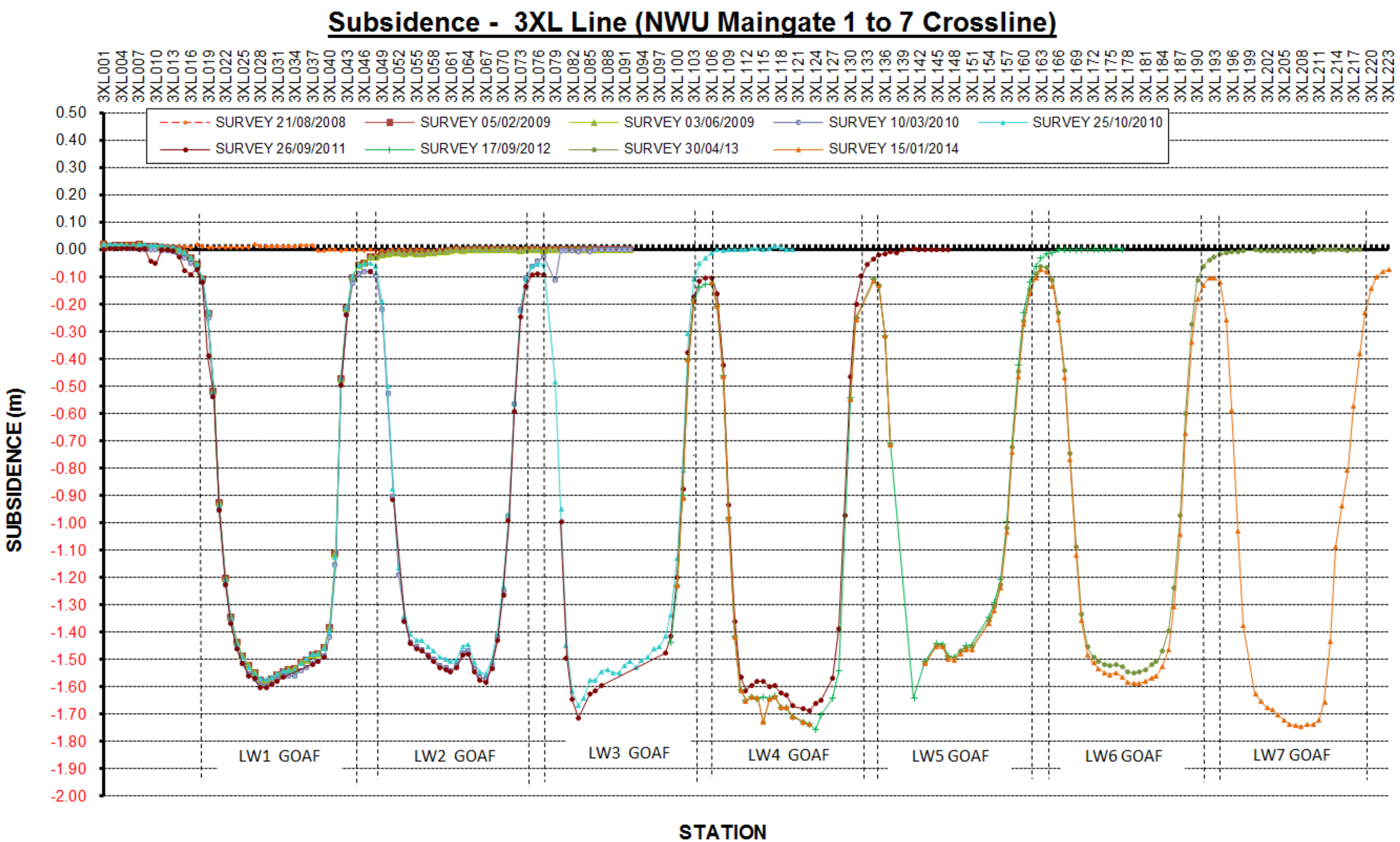


Figure 9 Subsidence Profile for Monitoring Line NWUXLI1

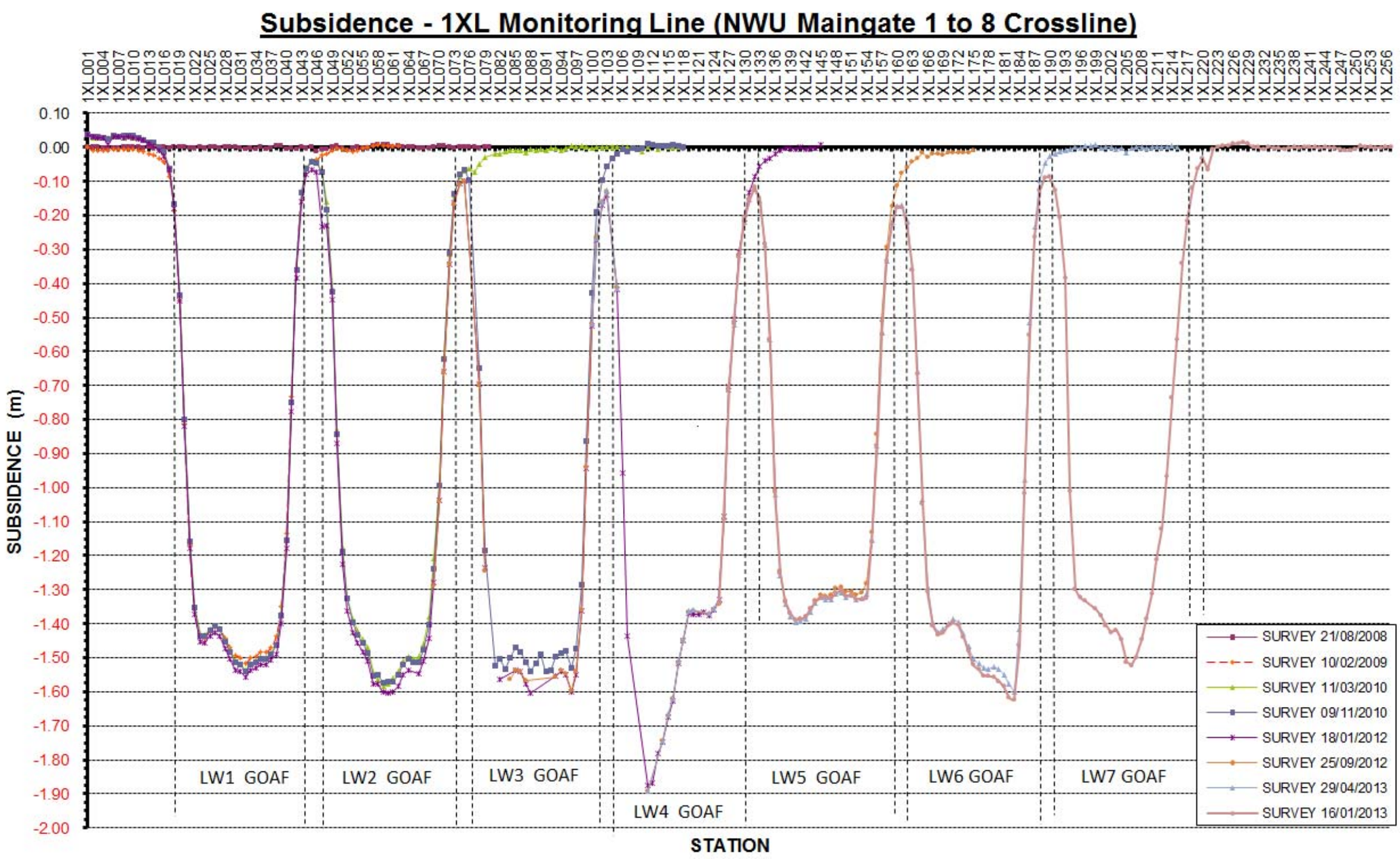


Figure 10 Subsidence Profile for Monitoring Line CL7B

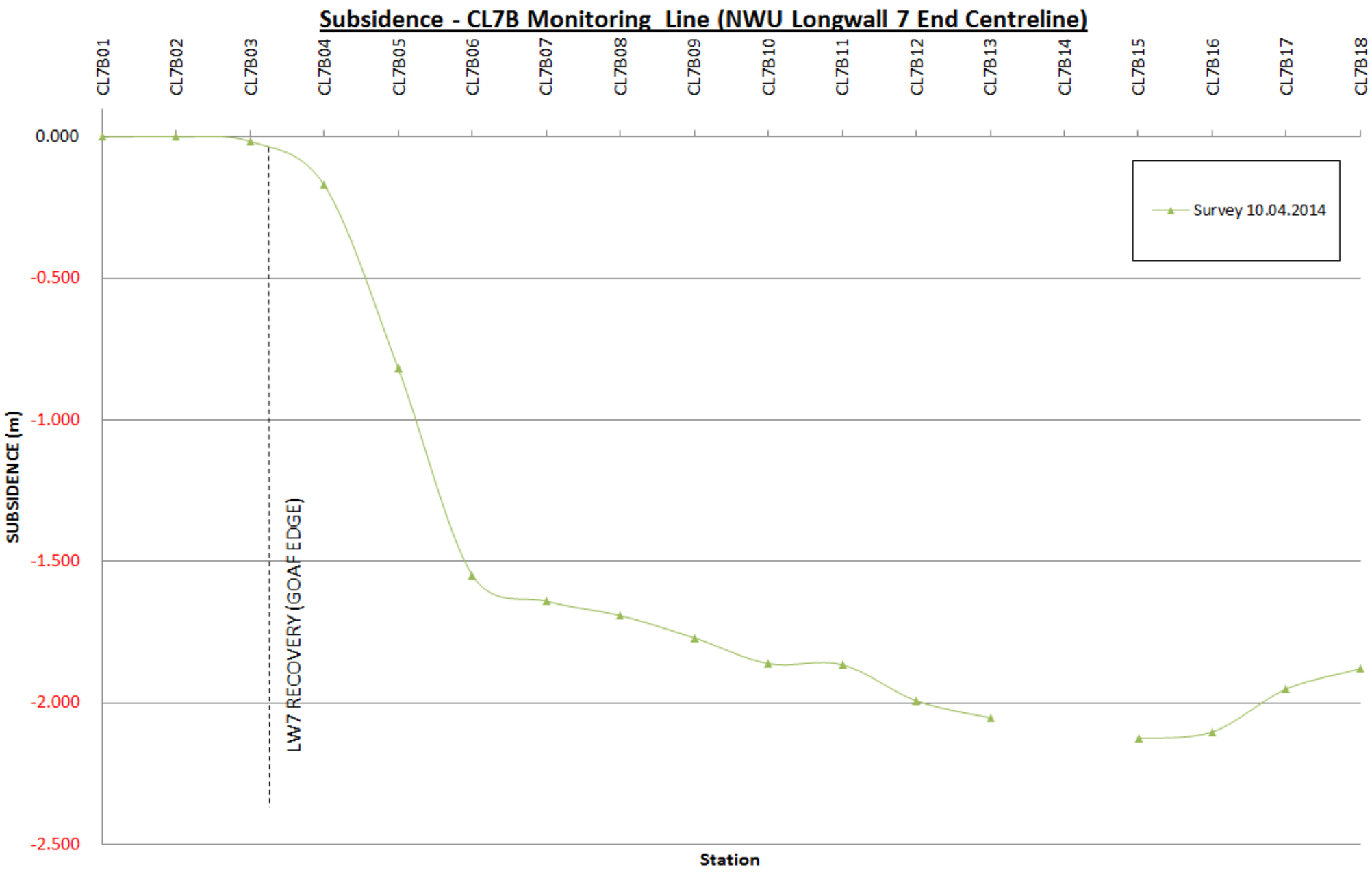


Figure 11 Subsidence Profile for Monitoring Line United 8A (Multi Seam)

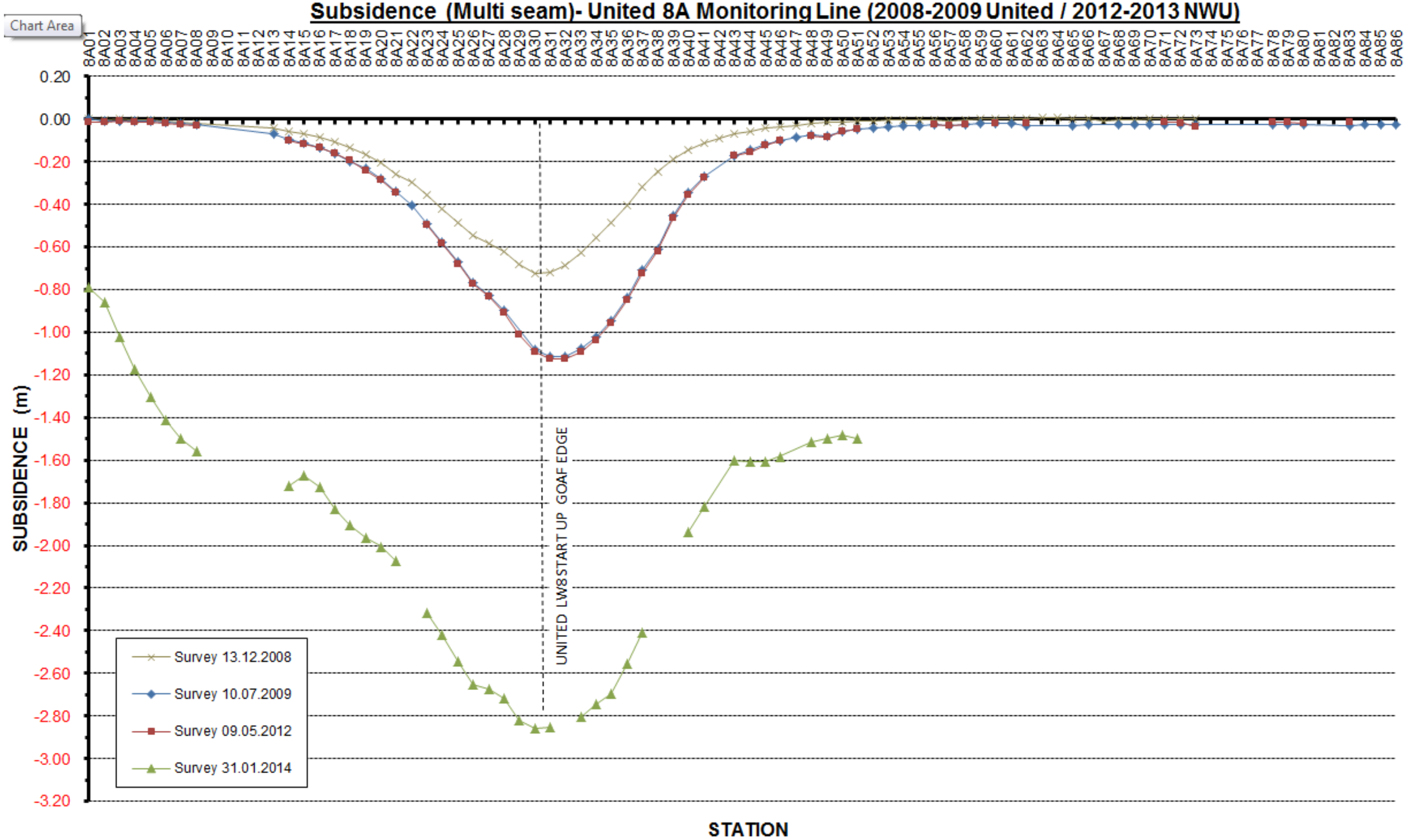
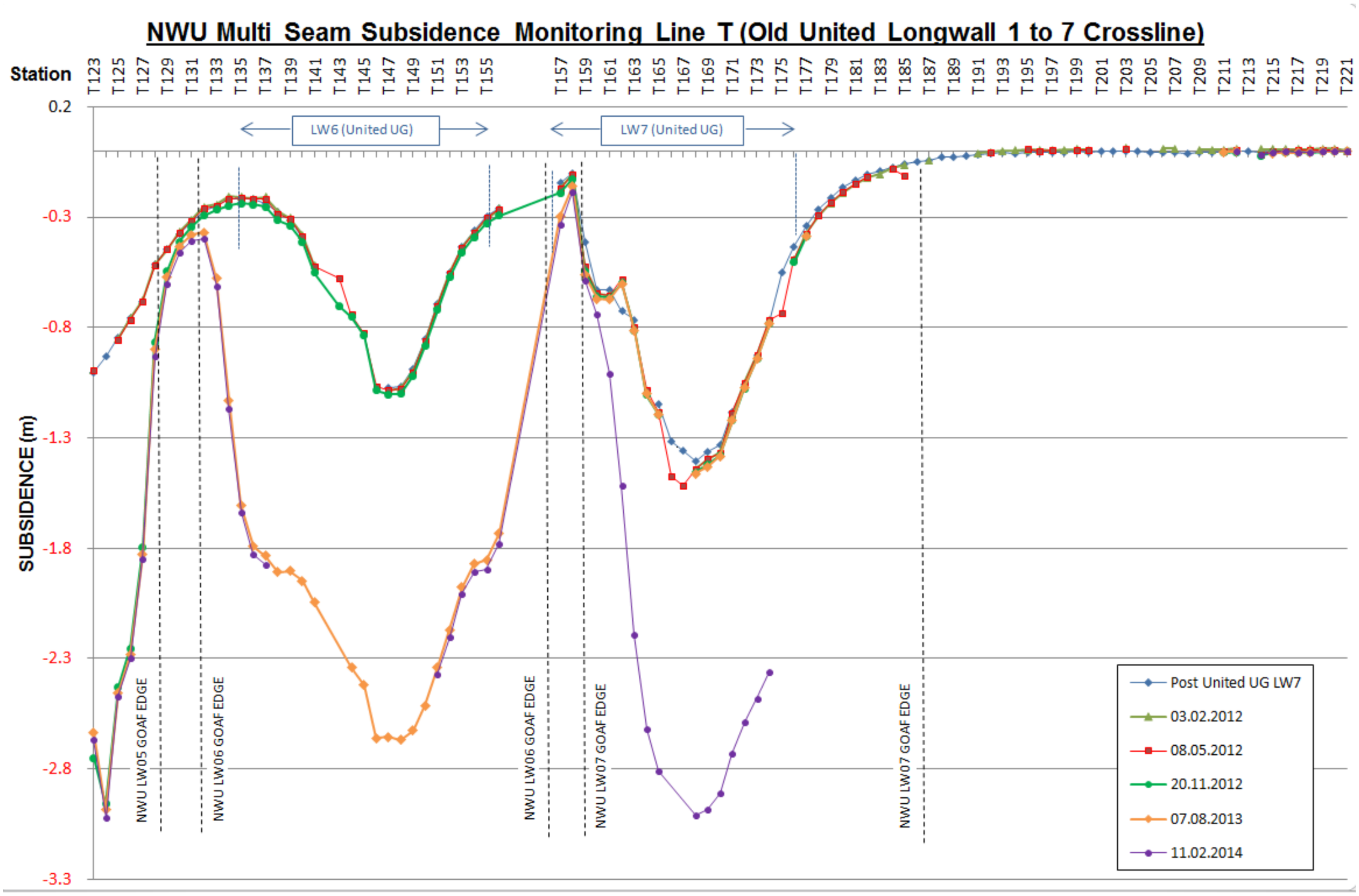


Figure 12 Subsidence Profile for Monitoring Line United T (Multi Seam)



APPENDIX B: GROUNDWATER MONITORING

Table A Groundwater Monitoring Results for P5 and P6

	P5			P6		
	pH	EC (uS/cm)	Depth to Water (m)	pH	EC (uS/cm)	Depth to Water (m)
Criteria	**6.0-9.5**	**750-5250**	**0.76-7.774**	**6.0-9.5**	**1500-3500**	**1.58-6.47**
1-Aug-06	7.46	2990	6.85	7.72	2990	9.45
1-Oct-06	7.35	4050	6.93	7.15	4050	5.55
1-Dec-06	7.54	4900	7.05	7.27	4900	5.63
1-Feb-07	7.46	3980	7.2	7.37	3980	5.73
1-Apr-07	7.65	4460	7.3	7.53	4460	5.85
1-Jun-07	6.96	3450	4.87		3450	
1-Aug–07	7.9	3440	5.85	7.1	700	440
1-Oct-07				7.2	910	4.85
1-Dec-07	7.8	3900	6.63	7.4	1160	50.2
1-Feb-08	7.8	3920	7.05	7.4	1719	5.52
1-Apr-08	7.07	3765	7.82	7.15	2194	6.18
1-Jun-08						
1-Aug-08	7.25	3580	8.26	7.24	2830	6.59
1-Oct-08	7.51	3350	8.21	7.31	2910	5.45
1-Dec-08	7.36	3460	8.25	7.25	2910	7.48
6-Jan-09	7.49	3020	8.89	7.25	2730	7.65
13-Jan-09	7.46	3421	8.99	7.22	2983	7.74
20-Jan-09	7.46	3387	9.08	7.23	2892	7.82
28-Jan-09	7.55	3396	9.18	7.31	3165	7.9
4-Feb-09	7.52	3402	9.26	7.29	3114	7.98
11-Feb-09	7.44	3575	9.33	7.29	3152	8.05
25-Feb-09	7.06	3430	7.04	7.12	2186	5.69
3-Mar-09	7.01	3157	7.47	7.11	1915	6.07
11-Mar-09	7.04	3322	7.71	7.18	1910	6.48
18-Mar-09	6.97	3195	7.79	7.22	1817	6.73
23-Mar-09	7.07	3211	7.89	7.3	1784	6.88
31-Mar-09	7.06	3279	8.11	7.26	1799	7.09
6-Apr-09	7.01	3163	4.93			
16-Apr-09	7.12	2878	5.38	7.44	691	3.94
22-Apr-09	7.17	2915	5.72	7.51	811	4.33
27-Apr-09	7.23	2965	6.01	7.56	954	4.85
5-May-09	7.23	2962	6.34	7.53	938	5.26
14-May-09	7.31	3066	6.61	7.7	973	5.67
19-May-09	7.31	2969	6.77	7.77	984	5.83
27-May-09	7.35	2940	6.98	7.88	1004	6.02
5-Jun-09	7.34	2818	7.17	7.64	919	6.08
17-Jun-09	7.37	2703	6.99	7.62	884	6.29
26-Jun-09	7.39	2514	6.86	7.59	856	6.45
21-Aug-09	7.61	2210	8.28	7.88	993	7.17
3-Sep-09	7.67	2216	8.49	7.97	1109	7.36
10-Sep-09	7.77	2148	8.52	8.09	1047	7.46
18-Sep-09	7.81	2122	8.64	8.05	1145	7.53
25-Sep-09	7.82	2089	8.71	7.89	1104	7.63
2-Oct-09	7.89	2026	8.86	7.92	1136	7.73
9-Oct-09	7.58	2047	8.96	7.49	1161	7.8
16-Oct-09	7.65	1986	9.06	7.39	1282	7.91
24-Oct-09	7.26	1660	9.15	7.05	1378	8.82
6-Nov-09	7.68	1709	9.28	7.49	1467	8.14
12-Nov-09	7.63	1761	9.2	7.3	1387	8
20-Nov-09	7.67	1642	9.28	7.28	1255	8.15
18-Dec-09	8.1	1632	9.84	7.27	1425	8.55
24-Dec-09	7.42	1594	9.7	7.22	1272	8.05
8-Jan-10	7.46	1571	9.19	7.69	1399	7.6
15-Jan-10	7.37	1698	9.3	7.25	1238	7.7
22-Jan-10	7.76	1687	9.56	7.71	1182	7.6
29-Jan-10	7.78	1600	9.64	8.01	1119	7.64
11-Feb-10	7.25	1727	8.09	7.15	804	4.66
19-Feb-10	7.37	1691	8.1	6.95	614	4.61
1-Mar-10	7.34	1693	8.46	6.9	7.31	5.75

	P5			P6		
	pH	EC (uS/cm)	Depth to Water (m)	pH	EC (uS/cm)	Depth to Water (m)
Criteria	**6.0-9.5**	**750-5250**	**0.76-7.774**	**6.0-9.5**	**1500-3500**	**1.58-6.47**
5-Mar-10	7.16	1659	8.62	7.02	660	6.15
12-Mar-10	7.26	1627	8.75	7.03	650	6.26
26-Mar-10	7.19	1642	9.1	6.9	606	6.55
4-Apr-10	7.03	1586	9.13	6.77	605	6.68
11-Apr-10	7.25	1552	9.17	6.81	601	6.59
23-Apr-10	7.18	1305	9.65	6.91	699	6.93
30-Apr-10	7.2	1494	9.53	6.64	691	7.9
14-May-10	7.26	1525	9.73	6.77	735	7.32
21-May-10	7.26	1483	9.83	7.45	747	7.44
27-May-10	7.1	1418	9.91	6.75	747	7.51
2-Jun-10	7.19	1435	9.77	7.03	765	7.46
10-Jun-10	7.24	1470	9.64	6.97	793	7.41
17-Jun-10	7.27	1521	9.58	7.15	907	7.35
24-Jun-10	7.45	1516	9.66	7.26	898	7.46
2-Jul-10	7.36	1488	9.91	6.94	918	7.61
9-Jul-10	7.31	1574	8.84	7	960	6.48
16-Jul-10	7.34	1565	8.96	7.06	972	6.51
23-Jul-10	7.41	1581	8.9	7.2	968	6.55
30-Jul-10	7.39	1578	8.93	7.12	979	6.69
6-Aug-10	7.45	1590	8.98	7.13	975	6.72
13-Aug-10	7.54	1594	9.02	7.17	970	6.83
20-Aug-10	7.71	1583	9.11	7.35	940	7.01
27-Aug-10	7.81	1576	9.3	7.75	1020	7.18
3-Sep-10	7.57	1569	9.37	7.46	1047	7.78
10-Sep-10	7.65	1513	9.43	7.6	1035	7.52
17-Sep-10	7.74	1472	9.49	7.55	994	7.36
23-Sep-10	7.61	1517	9.6	7.62	1005	7.52
1-Oct-10	7.53	1526	9.74	7.24	1015	7.6
8-Oct-10	7.48	1530	8.09	7.19	1007	7.71
15-Oct-10	7.73	1495	8.65	7.2	1005	7.76
22-Oct-10	7.95	1353	10.11	7.86	996	7.82
29-Oct-10	8.36	1420	9.65	8.45	1006	7.88
5-Nov-10	7.86	1495	9.2	8.32	1095	6.95
12-Nov-10	7.98	1536	8.95	8.1	1085	5.23
19-Nov-10	7.94	1584	8.56	7.58	1156	4.43
26-Nov-10	8.05	1538	8.65	7.81	1110	4.98
3-Dec-10	8.2	1512	8.81	7.95	655	5.85
10-Dec-10	8.02	1525	8.92	7.89	720	6.12
17-Dec-10	8.25	1515	8.75	8.09	620	6.08
24-Dec-10	8.3	1489	8.44	8.19	571	5.79
31-Dec-10	8.4	1404	8.56	8.43	562	5.95
7-Jan-11	8.45	1395	8.6	8.51	558	5.19
14-Jan-11	8.35	1391	8.52	8.06	561	6.32
21-Jan-11	8.43	1401	8.74	8.6	548	6.45
28-Jan-11	8.58	1440	8.89	8.68	532	6.57
18-Feb-11	8.52	1325	9.3	8.86	523	6.92
11-Mar-11	8.36	1337	9.62	8.02	554	7.2
18-Mar-11	8.61	1314	9.4	8.92	494	5.37
8-Apr-11	8.52	1317	8.86	8.04	469	5.52
6-May-11	8.15	1219	9.28	7.65	414	6.68
13-May-11	8.18	1202	9.39	8.1	414	6.82
20-May-11	8.4	1185	9.49	8.53	427	6.95
27-May-11	8.44	1197	9.59	8.32	422	7.07
3-Jun-11	7.4	1184	9.36	8.51	380	4.41
10-Jun-11	8.45	1190	9	8.65	385	5.86
24-Jun-11	7.78	1214	8.05	8.05	501	2.13
1-Jul-11	8.04	1188	7.85	8.13	515	3.34
8-Jul-11	8.07	1129	7.9	7.7	256	4.08
15-Jul-11	8.18	1149	8.41	8.35	537	5.21
22-Jul-11	8.4	1101	8.07	8.78	525	5.04
29-Jul-11	8.54	1071	8.18	9.05	521	5.26
12-Aug-11	8.58	1062	8.39	8.89	552	5.59
26-Aug-11	8.44	957	8.78	8.36	525	6.36

	P5			P6		
	pH	EC (uS/cm)	Depth to Water (m)	pH	EC (uS/cm)	Depth to Water (m)
Criteria	**6.0-9.5**	**750-5250**	**0.76-7.774**	**6.0-9.5**	**1500-3500**	**1.58-6.47**
9-Sep-11	7.3	945	8.74	7.4	608	6.12
16-Sep-11	7.58	887	8.46	7.4	562	6.24
23-Sep-11	7.74	751	6.35	7.68	918	8.67
30-Sep-11	7.52	968	8.74	7.18	636	6.25
7-Oct-11	7.56	834	8.3	7.62	666	5.42
14-Oct-11	7.47	804	8.44	7.08	688	5.2
21-Oct-11	7.5	825	8.16	7.1	789	5.3
28-Oct-11	757	877	8.32	732	812	5.6
4-Nov-11	7.53	839	8.46	7.7	770	5.93
11-Nov-11	7.75	868	8.6	7.17	779	5.98
18-Nov-11	7.49	840	8.68	7.07	862	6.12
2-Dec-11	8.03		7.23			
9-Dec-11	7.04	830	7.59	7.01	422	2.45
16-Dec-11	7.39	874	6.65			
6-Jan-12	7.35	838	6.93	7.09	455	3.84
13-Jan-12	7.38	866	7.13	6.94	431	4.27
20-Jan-12	7.46	893	7.29	7.04	558	4.6
10-Feb-12	7.4	830	7.65	7.09	416	3.71
17-Feb-12	7.39	847	3.48	7.26	437	4.66
2-Mar-12	7.42	683	7.71			
9-Mar-12	7.46	771	6.6			
16-Mar-12	7.59	798	6.44	7.57	376	1.37
23-Mar-12	7.4	843	6.82	7.15	373	2.9
2-Apr-12	7.48	843	7.07	7.15	418	3.84
13-Apr-12	7.53	851	7.4	7.73	439	4.48
20-Apr-12	7.43	839	7.45	7.04	376	4.8
4-May-12	7.44	802	7.66	7.12	459	6.1
11-May-12	7.45	845	8	7.14	502	5.66
18-May-12	7.35	782	8.1	7.05	411	5.9
25-May-12	7.26	718	8.45	6.75	424	6.14
1-Jun-12	7.37	739	7.66	7.33	430	6.04
15-Jun-12	7.38	716	9	7.26	414	7.1
22-Jun-12	7.47	659	8.3	7.58	446	6.6
29-Jun-12	7.43	710	8.73	7.59	503	6.55
6-Jul-12	7.36	706	8.89	7.26	764	6.6
13-Jul-12	7.13	718	9	6.85	534	6.4
23-Jul-12	7.27	707	8.7	7.14	560	6.34
3-Aug-12	7.34	772	9	7.31	543	6.5
17-Aug-12	7.32	732	8.68	7.4	597	6.6
24-Aug-12	7.33	740	8.74	7.44	580	6.7
31-Aug-12	7.3	736	8.72	7.46	574	6.81
7-Sep-12	7.35	792	8.71	7.44	580	6.79
14-Sep-12	7.3	750	8.8	7.43	578	6.8
21-Sep-12	7.38	755	8.76	7.5	570	6.82
28-Sep-12	7.3	755	8.85	7.49	578	6.98
5-Oct-12	7.44	818	9.7	7.35	677	7
12-Oct-12	7.3	667	9.9	7.3	613	7.12
19-Oct-12	7.36	694	9.8	7.32	645	7.4
2-Nov-12	7.49	767	10.3	7.53	792	7.93
9-Nov-12	7.28	716	10.5	7.41	696	7.8
16-Nov-12	7.3	705	10.34	7.41	699	7.77
23-Nov-12	7.28	701	10.24	7.42	781	7.77
30-Nov-12	7.29	824	10.2	7.3	724	7.66
7-Dec-12	7.27	796	10	7.17	868	7.95
14-Dec-12	7.25	722	10.18	7.26	785.5	8
21-Dec-12			10.91	7.3	802	7.81
28-Dec-12	7.43	728	10.62	7.4	852	8.6
4-Jan-13	7.23	718	10.45	7.25	800	8.24
11-Jan-13	7.23	702	10.59	7.39	881	8.17
18-Jan-13	7.39	753	10.65	7.43	1017	8.25
25-Jan-13	7.49	743	10.63	7.6	885	8.37
1-Feb-13	7.04	577	10.46	6.98	595	8.13
8-Feb-13	7.42	674	10.13	7.58	622	8.17

	P5			P6		
	pH	EC (uS/cm)	Depth to Water (m)	pH	EC (uS/cm)	Depth to Water (m)
Criteria	**6.0-9.5**	**750-5250**	**0.76-7.774**	**6.0-9.5**	**1500-3500**	**1.58-6.47**
15-Feb-13	7.27	710	10.66	7.45	781	9.16
22-Feb-13	7.84	766	10.36	7.57	777	8.96
4-Mar-13	7.2	686	7.81	7.27	672	6.62
8-Mar-13	7.39	666	8.4	7.28	618	6.87
15-Mar-13	7.15	827	7.3	6.93	646	6.8
22-Mar-13	7.48	862	8.6	7.38	679	6.6
8-Apr-13	7.46	861	9.42	7.62	826	6.76
19-Apr-13	7.73	798	9.74	7.89	700	7.38
26-Apr-13	7.32	809	9.35	7.34	657	7.63
3-May-13	7.48	705	10.62	7.42	629	8.5
10-May-13	7.56	703	9.36	7.63	601	7.86
17-May-13	7.48	693	10.13	7.4	602	7.93
24-May-13	7.55	670	8.44	7.52	594	8
30-May-13	7.25	692	9.8	7.17	627	7.93
7-Jun-13	6.99	678	10.7	6.88	680	8.55
17-Jun-13	7.83	761	10.2	7.86	728	7.94
21-Jun-13	7.51	675	10.53	7.46	688	8.23
28-Jun-13	7.07	668	11	6.33	691	9.2
4-Jul-13	7.33	670	11.7	7.3	641	8.5
5-Aug-13	7.26	702	10.8	7.16	587	8.27
12-Aug-13	7.66	757	10.82	7.4	686	8.46
16-Aug-13	7.88	669	11	7.76	772	8.53
23-Aug-13						
30-Aug-13	7.68	718	10.42	7.53	839	7.96
13-Sep-13	7.33	654	10.54	7.28	751	8.11
20-Sep-13	7.46	683	10.65	7.29	712	8.57
27-Sep-13	7.46	737	11.18	7.31	769	8.46
4-Oct-13	7.35	666	11.2	7.12	735	8.54
14-Oct-13	7.43	843	11.18	*	*	*
17-Oct-13			10.97	*	*	*
4-Nov-13	7.43	830	11.22	*	*	*
8-Nov-13	7.54	900	11.51	*	*	*
15-Nov-13	7.48	643	11.58	*	*	*
25-Nov-13	7.40	783	11.41	*	*	*
13-Dec-13	7.51	582	11.20	*	*	*
18-Dec-13	7.17	864	10.89	*	*	*
21-Jan-14	7.74	909	11.36	*	*	*
3-Feb-14	7.39	938	11.20	*	*	*
10-Feb-14	7.60	858	10.87	*	*	*
7-Mar-14	6.82	839	10.75	*	*	*
17-Mar-14	7.02	854	11.15	*	*	*
25-Mar-14	^	^	^	*	*	*

Note: Shaded cell indicates dry at the time of sampling. Blank cell indicates no available results.
^P5 decommissioned due to Open Cut mine operations.
*P6 decommissioned due to Open Cut mine expansion.

Table B Groundwater Monitoring Results for P301 & P315

	P315			P301		
	pH	EC (uS/cm)	Depth to Water (m)	pH	EC (uS/cm)	Depth to Water (m)
Criteria	**6.0-9.5**	**250-600**	**2.26-11.90**	**6.0-9.5**	**8,500-10,000**	**8.77-15.98**
Aug-06				6.72	8,630	13.77
Oct-06				6.64	8,620	13.87
Dec-06				6.26	8,840	13.96
Feb-07				6.19	8,890	14.14
Apr-07				6.28	8,790	14.21
Jun-07	7.73	389	4.35	6.94	2,343	12.77
Aug-07	6.6	361	5.66	7.5	2030	11.77
Oct-07	6.63	401	7.22	7.48	3110	11.51
Dec-07	6.27	415	6.44	7.48	3060	11.98
Feb-08	6.19	350	4.92	7.56	2830	11.59
Apr-08	6.15	369	7.52	7.13	3360	11.04
Jun-08	6.17	350	8.09	7.12	3670	11.92
Aug-08	6.2	558	8.91	7.3	3770	12.2
Oct-08	6.1	459	8.11	7.1	3560	12.31
Dec-08	5.9	454	8.33	7.2	3520	12.5
Feb-09	6.6	278	4.72	6.8	3840	11.45
Apr-09	6.6	278	4.72	6.9	3150	10.3
Jun-09	6.51	361	7.37	7.1	3140	10.26
Aug-09	6.4	533	7.24	7.3	2990	11.4
Oct-09	6	461	8.72	7.3	2850	11.79
Dec-09	6.2	550	9.23	7.5	2800	12.03
Feb-10				7.7	2470	12.34
Apr-10				6.9	6200	12.32
Jun-10				7	4150	12.7
Aug-10				7	3730	12.79
Oct-10				6.9	3280	12.92
Dec-10	7.4	262	5.13	6.9	3760	11.98
Feb-11				7.1	2910	11.08
Apr-11				6.9	2600	11.09
Jun-11				6.7	2420	10.52
Aug-11	6.4	376	4.67	7.2	2,420	10.13
Oct-11	6.9	593	6.14	7.4	2,420	10.57
Dec-11	7.5	365	3.77	7	2,490	19.9
Feb-12	3.7	624	4	6.5	2,130	13.2
Apr-12				6.8	4,040	13.28
Jun-12				7	3,230	13.6
Aug-12	6.4	758	7.13	7.1	1,086	14.22
Oct-12	6.4	384	7.4	6.5	2,860	14.2
Dec-12	6.7	309	7.95	6.6	5,780	16.3
Feb-13	7.1	273	4	6.6	6,450	15.95
Apr-13	7.4	381	4.91	6.9	3,700	19.4
Jun-13	7.4	405	6.65	7.5	4,440	14.55
Aug-13	6	445	7.32	6.6	5,810	15.29
Oct-13	6.2	351	6.18	6.7	6,410	15.36
Dec-13	7.1	546	7.98	6.4	6,010	15.53
Feb-14	6.9	417	8.31	6.7	6,600	15.79
Apr-14	6.8	307	4.14	6.6	6,520	16.15
Jun-14	6.4	387	5.99	6.8	5,170	15.29
Aug-14	6.7	344	7	6.8	6,090	14.93

Note: Shaded cell indicates P315 was dry at the time of sampling

Table C Groundwater Monitoring Results for GW08 & GW09

	GW08			GW09		
	pH	EC (uS/cm)	Depth to Water (m)	pH	EC (uS/cm)	Depth to Water (m)
Criteria	**6.0-9.5**	**1500-2500**	**1.17-3.80**	**6.0-9.5**	**1500-1800**	**2.02-2.85**
Aug-06	7	1,872	3	7.17	1,765	3.03
Oct-06	6.89	1,887	3.05	7.16	1,816	3.1
Dec-06	7.13	1,774	3.14	7.25	1,710	3.2
Feb-07	7.13	1,816		7.19	1,767	3.3
Apr-07	6.98	1,770		7.46	1,807	3.6
Jun-07						
Aug-07	7.1	1,840	3.35	7.5	1,490	3
Oct-07				7.3	1,700	2.95
Dec-07	7.3	1,630	3.1	7.4	1,140	3.9
Feb-08	7.58	1,616	3.05	7.58	1,398	3.08
Apr-08	7.08	1,953	3.09	7.61	1,650	3.23
Jun-08	7.2	1,936	3.2	7.6	1,579	3.52
Aug-08	7.45	1920	3.32	7.4	1690	3.64
Oct-08	6.65	1910	3.32	7.49	1800	3.61
Dec-08	6.9	1,910	3.36	7.52	1,350	3.64
Feb-09	7.34	1,840	3.29	7.8	1,180	3.57
Apr-09	7.1	2,033	3.2	7.9	1,020	3.4
Jun-09	6.94	3,260	2	7.73	1,478	3.5
Aug-09				6.74	1,550	3.5
Sep-09	5.69	1,974	3.2	7.97	1,654	3.54
Nov-09	7.07	1,937	3.3	7.95	1,673	3.64
Jan-10	7.02	1,981	3.43	7.96	734	3.69
Mar-10	7.06	1,830	3.34	8.29	985	3.74
May-10	6.92	1,938	3.42	7.36	1,265	3.75
Aug-10	7.57	1,937	3.36	8.11	1,341	3.73
Oct-10	6.88	1,926	3.4	7.94	1,456	3.77
Dec-10	7.13	1,865	3.35	8.11	459	3.7
Feb-11	7.73	1,838	3.46	8.81	287	3.78
Apr-11	6.99	1,868	3.47	8.12	565	3.87
Jun-11	6.81		3.38	7.95		3.75
Aug-11	6.86	1,925	3.39	7.7	657	3.78
Oct-11	6.83	1,767	**3.28**	7.72	374	3.79
Dec-11	5.94	1,836	3.3	7.87	374	3.7
Feb-12	7.94	1,864	3.27	8.28	555	3.65
Apr-12	7.22	1,847	3.37	7.55	420	3.83
Jun-12	6.94	1,846	3.41	8.22	446	4.0
Aug-12	7.04	1740	3.72	7.54	433	4.47
Oct-12	7.25	1887	4.07	8.29	502	4.88
Dec-12	7.54	1780	4.32	8.38	487	5.14
Feb-13	7.54	1371	4.46	7.75	375	5.44
Apr-13	6.99	1853	4.3	8.14	418	5.2
Jun-13	6.86	1928	4.57	8.48	487	5.52
Aug-13	7.04	1747	4.78	8.56	484	5.77
Oct-13	7.12	1897	4.99	8.34	591	5.94
Dec-13	7.02	1980	5.11	7.89	484	6.19
Feb-14	8.19	1811	5.4	8.49	427	6.36
Apr-14	7.19	1720	5.14	7.58	422	6.59
Jun-14	8.44	1838	5.49	8.62	502	6.7

Note: Shaded cell indicates the piezometers was dry at the time of sampling. Blank cell indicates no available result.

Figure 1a North Wambo Creek Groundwater Monitoring (P5) & Rainfall Data

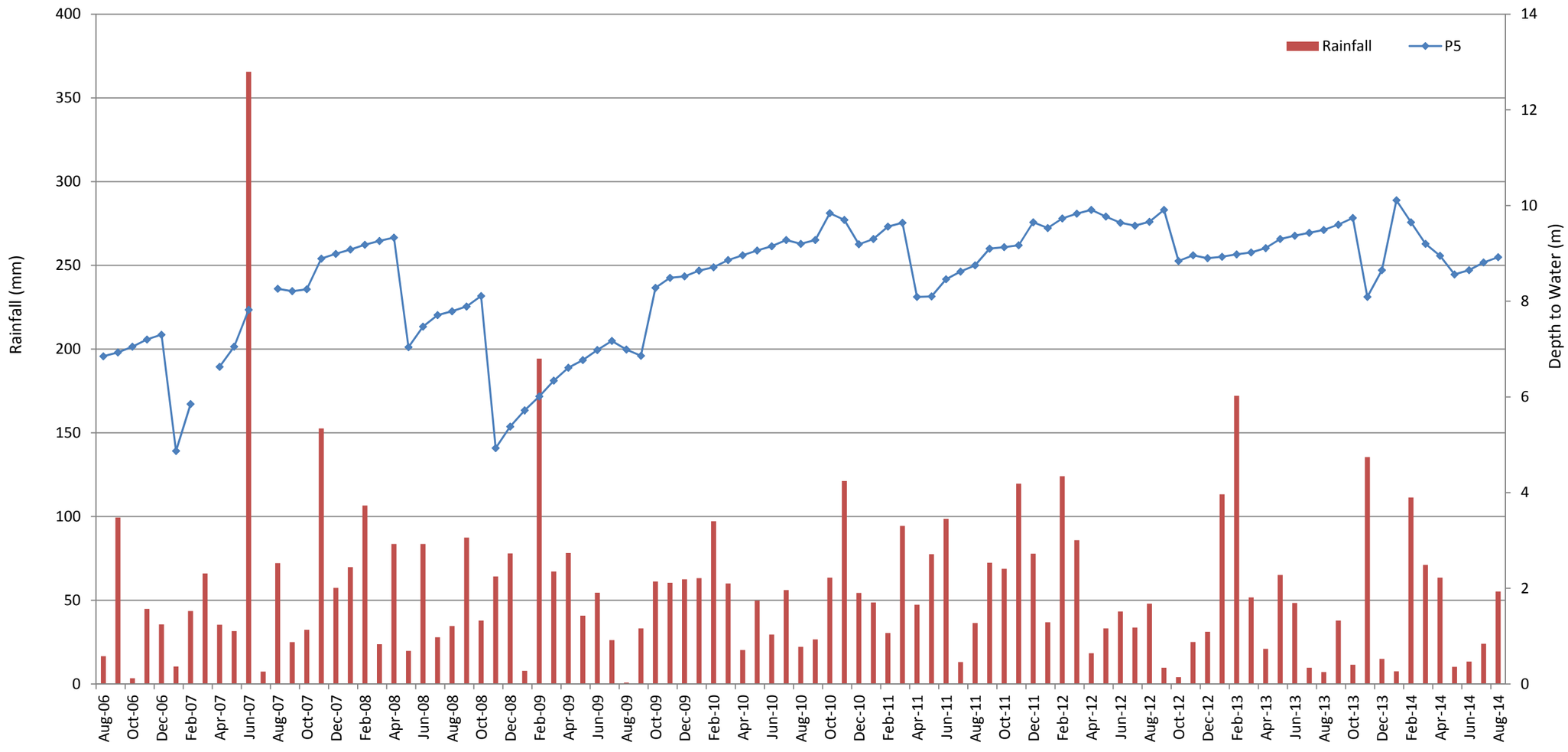


Figure 1b North Wambo Creek Groundwater Monitoring (P6) & Rainfall Data

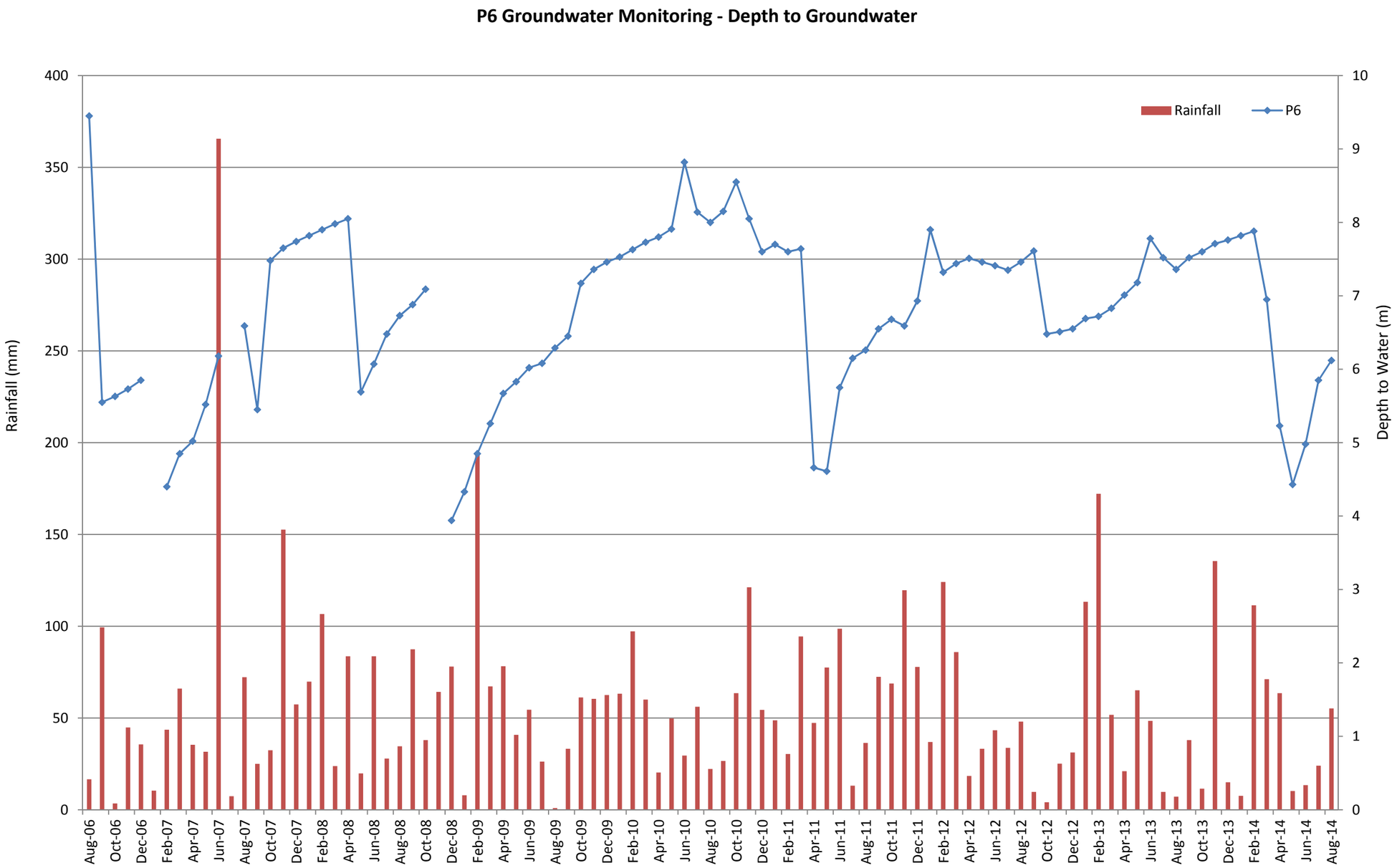


Figure 1c P5 & P6 Groundwater Monitoring

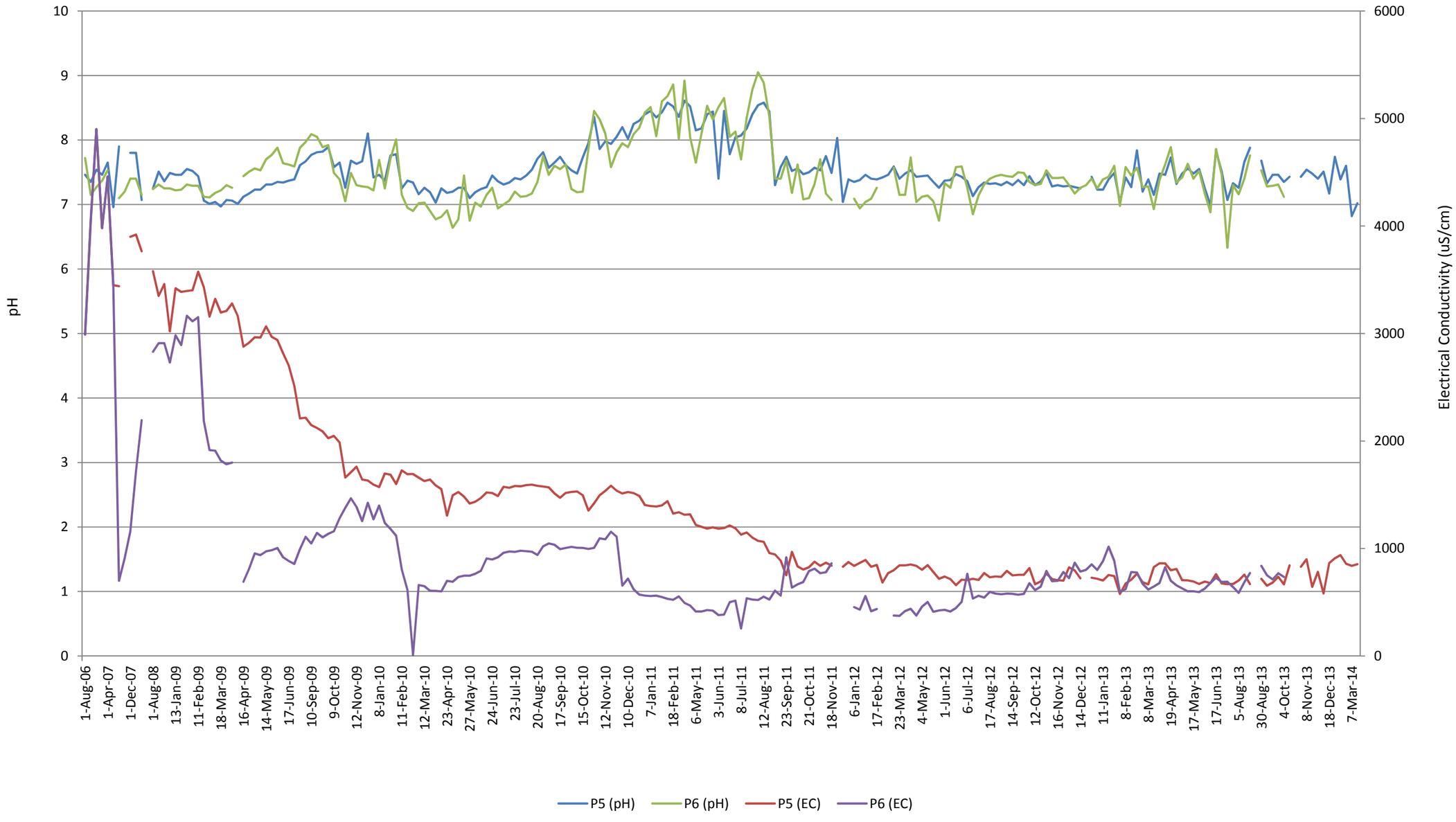


FIGURE 2a Groundwater Monitoring Results for P301

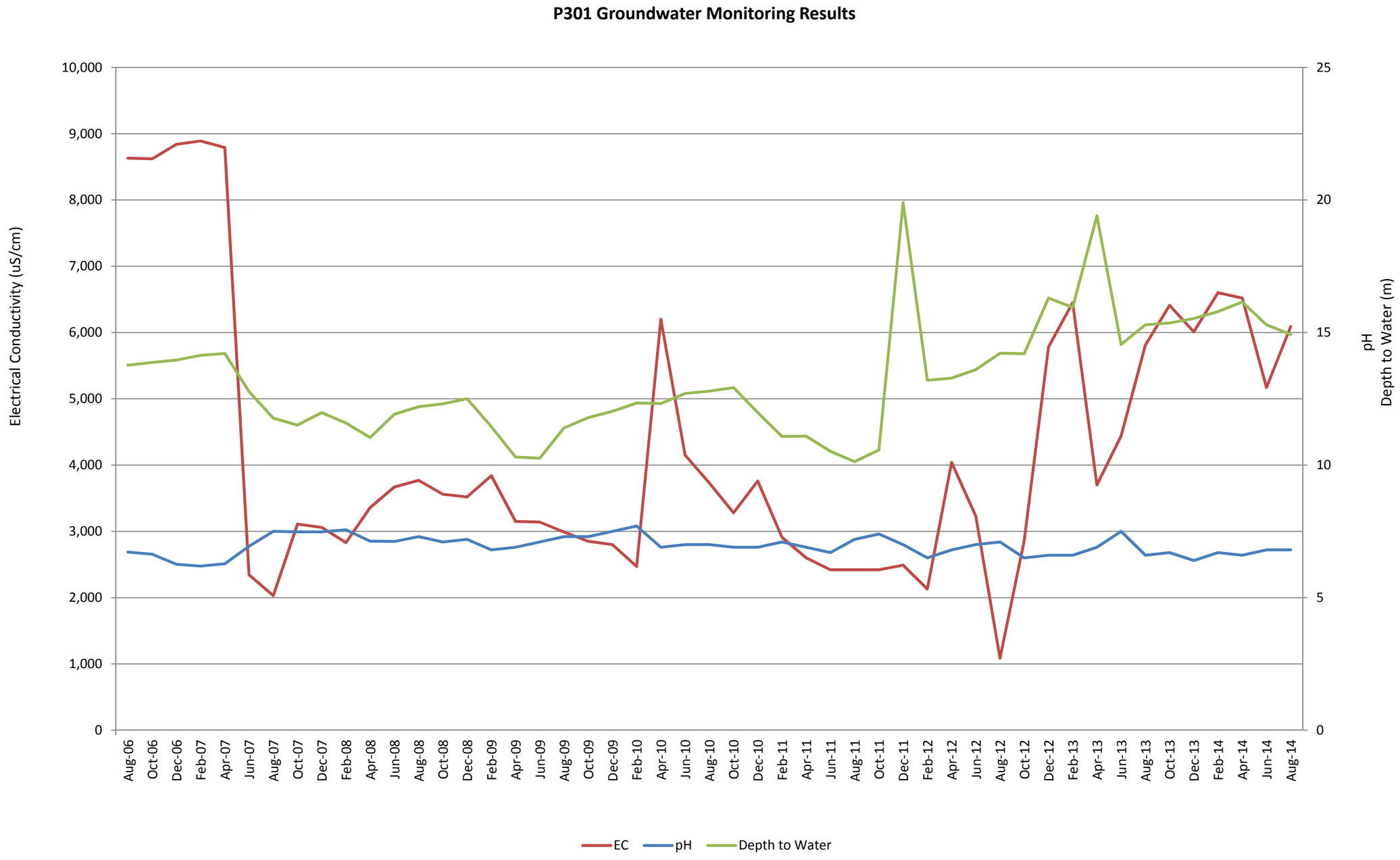


FIGURE 2b Groundwater Monitoring Results for P315

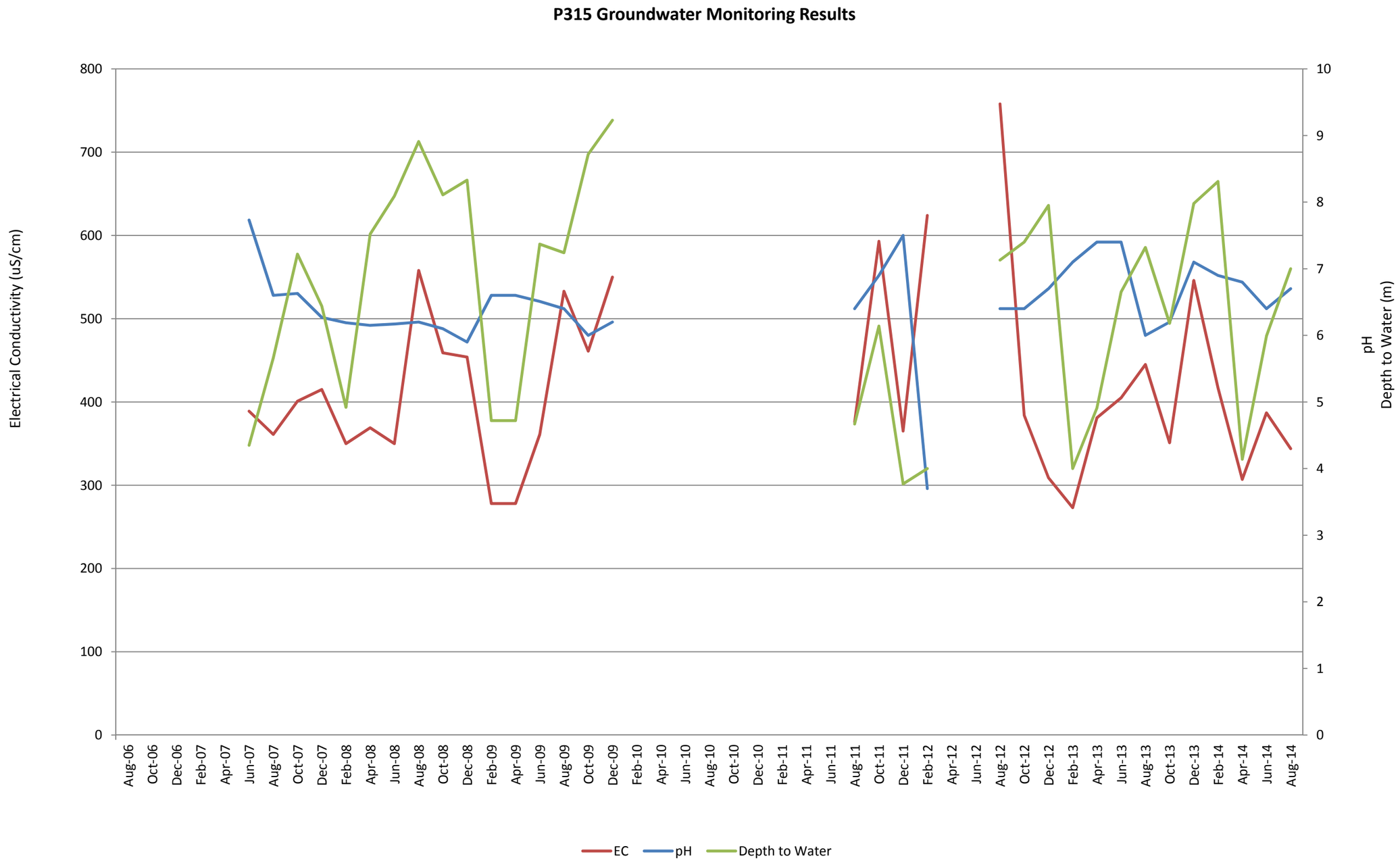


FIGURE 2c Groundwater Monitoring Results for GW08

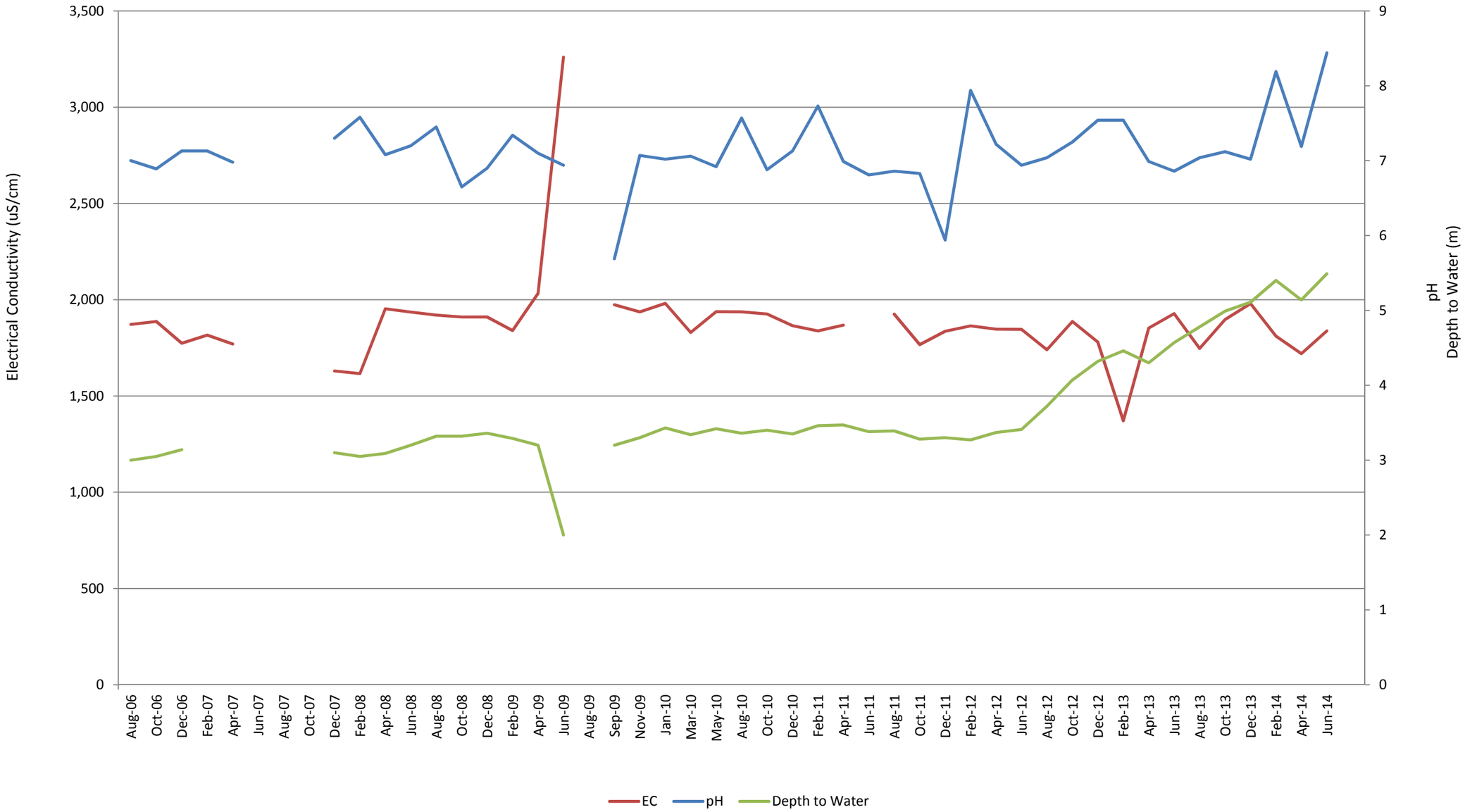
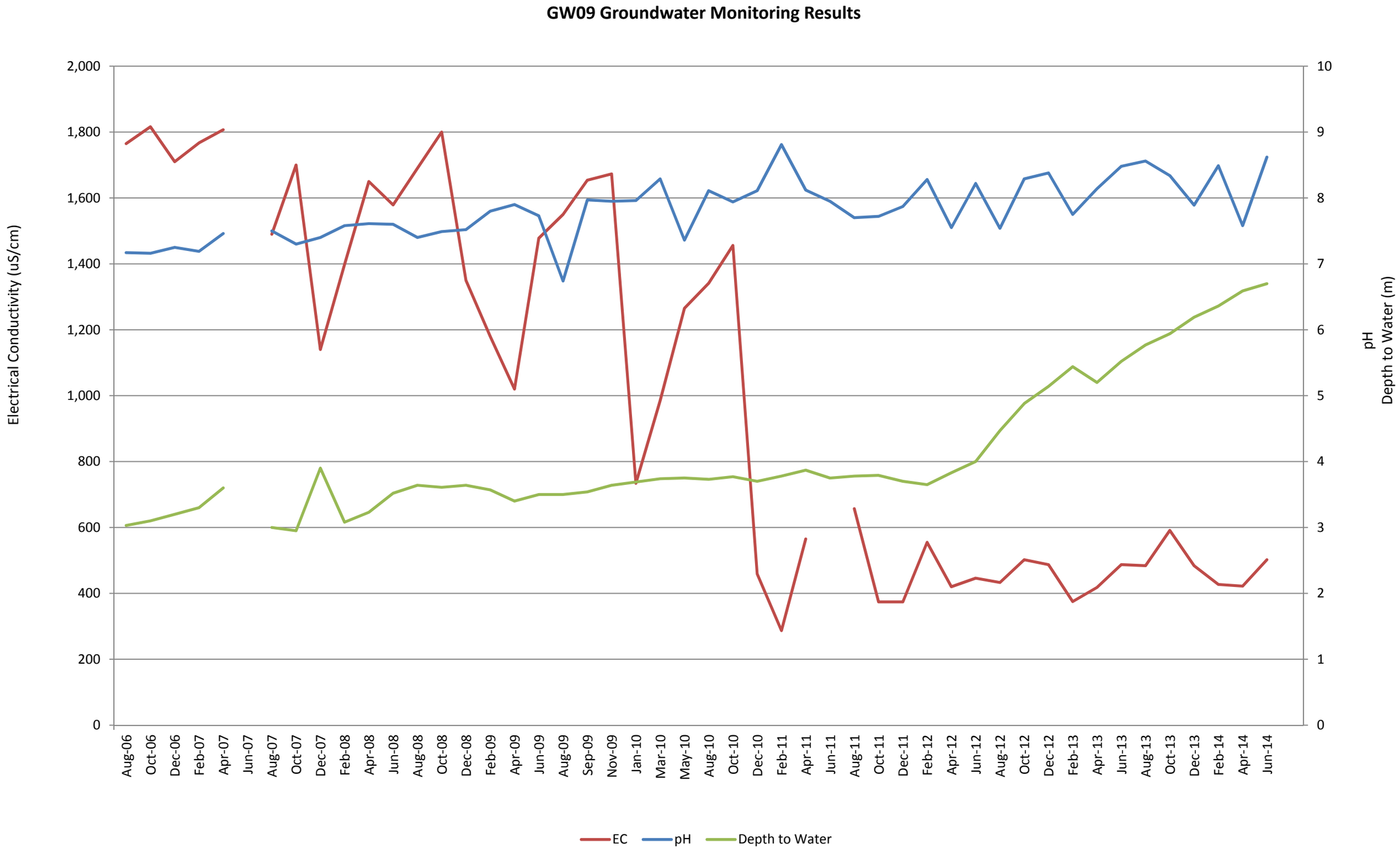


FIGURE 2d Groundwater Monitoring Results for GW09



APPENDIX C: SURFACEWATER MONITORING

TABLE A Surface water monitoring results for North Wambo Creek

Month	SW04 - North Wambo Creek Upper				SW27 - North Wambo Creek Middle Lower				SW32 - North Wambo Creek Pump				SW05 - North Wambo Creek Down			
	pH	EC (uS/cm)	TSS (mg/L)	TDS (mg/L)	pH	EC (uS/cm)	TSS (mg/L)	TDS (mg/L)	pH	EC (uS/cm)	TSS (mg/L)	TDS (mg/L)	pH	EC (uS/cm)	TSS (mg/L)	TDS (mg/L)
Criteria	6.0-9.5	2,093	120	N/A	**6.0-9.5**	**2,093**	**120**	**N/A**	**6.0-9.5**	**2,093**	**120**	**N/A**	**6.0-9.5**	**2,093**	**120**	**N/A**
Jul-06													8.14	2,068	40	1,200
Aug-06													8.38	1,938	11	1,092
Sep-06													8.37	2,105	150	1,100
Oct-06													8.96	2,111	24	1,182
Nov-06													8.7	2,188	52	1,184
Dec-06													8.35	2,146	138	1,204
Jan-07													8.55	2,666	115	1,380
Feb-07									8.14	6,970	136	4,400				
Mar-07																
Apr-07																
May-07																
Jun-07					8.76	472	18	348	8.71	563	24	378	7.48	1,303	22	800
Jul-07	8.38	393	70	214									7.7	358	7	2,162
Aug-07					7.9	52	362	252					7.5	3,080	114	1,934
Sep-07	8.1	350	**2,712**	154									7.63	3,200	16	1,950
Oct-07													7.67	2,680	4	1,536
Nov-07													7.51	1,880	8	1,012
Dec-07													7.23	877	24	532
Jan-08													7.77	2,760	8	1,656
Feb-08													7.68	2,330	4	1,284
Mar-08													7.74	2,540	14	1,182
Apr-08													7.79	2,160	11	1,345
May-08													7.62	2,390	10	1,180
Jun-08													8.16	113	188	178
Jul-08													7.6	2,410	14	1,272
Aug-08													7.82	2,270	8	1,268
Sep-08													7.8	319	76	460
Oct-08													7.6	2,060	11	1,034
Nov-08													7.8	2,290	5	1,272
Dec-08													7.7	1,960	11	1,085
Jan-09													7.7	2,000	6	1,142
Feb-09					7.3	408	4,900	490					7.3	1,429	80	830
Mar-09													7.3	2,510	6	1,620
Apr-09					7.2	140	810	530	7.4	220	3,400	400	7.1	165	1,100	570
May-09													7.8	2,470	3	1,390
Jun-09													7.2	1,175	36	624

Month	SW04 - North Wambo Creek Upper				SW27 - North Wambo Creek Middle Lower				SW32 - North Wambo Creek Pump				SW05 - North Wambo Creek Down			
	pH	EC (uS/cm)	TSS (mg/L)	TDS (mg/L)	pH	EC (uS/cm)	TSS (mg/L)	TDS (mg/L)	pH	EC (uS/cm)	TSS (mg/L)	TDS (mg/L)	pH	EC (uS/cm)	TSS (mg/L)	TDS (mg/L)
Criteria	6.0-9.5	2,093	120	N/A	**6.0-9.5**	**2,093**	**120**	**N/A**	**6.0-9.5**	**2,093**	**120**	**N/A**	**6.0-9.5**	**2,093**	**120**	**N/A**
Jul-09													8	2,190	1	1,172
Aug-09													8.1	2,180	2	1,300
Sep-09													7.6	2,280	2	1,200
Oct-09													7.8	1,970	7	1,000
Nov-09													7.8	2,330	20	1,300
Dec-09													7.3	2,330	25	1,200
Jan-10					7.5	366	1,500	670					7.2	1,930	72	1,500
Feb-10					7.5	210	430	320					7.5	1,274	44	310
Mar-10													7.4	2,000	8	1,100
Apr-10													7.4	2,410	6	1,356
May-10													7.5	2,140	13	1,230
Jun-10													7.4	2,300	4	1,290
Jul-10					8.2	206	164	452					8	370	42	296
Aug-10													7.5	2,250	2	1,200
Sep-10													7.9	2,310	15	1,280
Oct-10									8.2	233	601	642	7.7	1,513	26	764
Nov-10					7.8	177	48	262					7.6	281	82	1,998
Dec-10					7.9	228	26	628					7.2	1,243	<5	750
Jan-11						236	244	626					7.4	819	26	526
Feb-11					7.5	282	52	350					7.3	1,890	10	1,100
Mar-11					7.4	1,718	1,600	2,000					7.4	1,344	9	802
Apr-11													7.2	2,120	<5	1,110
May-11													7.2	2,130	8	1,280
Jun-11					7.34	316	404	690					7.84	405	39	398
Jul-11													7.6	2,290	<5	1,310
Aug-11					7	438	60	570					7.5	2,160	<5	1,190
Sep-11					8	296	508	596					7.7	1,702	60	1,030
Oct-11					7.2	275	111	826					7	381	38	356
Nov-11													7.4	2,050	28	1,180
Dec-11	8	280	**<5**	173	8.1	244	42	297					7.8	350	71	406
Jan-12													7.6	2,230	16	340
Feb-12					7.8	202	316	626					7.3	1,297	48	748
Mar-12					7.9	1,122	548	700					7.6	221	85	172
Apr-12													7.8	2,470	6	1,320
May-12													7.8	2,310	<5	1,290
Jun-12													7.3	2,060	<5	1,250
Jul-12					8.4	169	760	785					7.8	1,498	200	938
Aug-12													7.8	1,940	10	1,130
Sep-12													7.4	2,060	8	1,230
Oct-12													8.1	2,360	23	1,280

Month	SW04 - North Wambo Creek Upper				SW27 - North Wambo Creek Middle Lower				SW32 - North Wambo Creek Pump				SW05 - North Wambo Creek Down			
	pH	EC (uS/cm)	TSS (mg/L)	TDS (mg/L)	pH	EC (uS/cm)	TSS (mg/L)	TDS (mg/L)	pH	EC (uS/cm)	TSS (mg/L)	TDS (mg/L)	pH	EC (uS/cm)	TSS (mg/L)	TDS (mg/L)
Criteria	6.0-9.5	2,093	120	N/A	**6.0-9.5**	**2,093**	**120**	**N/A**	**6.0-9.5**	**2,093**	**120**	**N/A**	**6.0-9.5**	**2,093**	**120**	**N/A**
Nov-12													7.9	2,250	13	1,270
Dec-12																
Jan-13													7.3	241	456	512
Feb-13													7.3	629	96	544
Mar-13													7.3	280	1110	415
Apr-13													7.6	2,480	2	1,390
May-13	7.3	256	**5**	157	7.6	267	4440	916	7.6	330	2310	622	7.5	2,160	1	1,180
Jun-13													7.1	1,432	27	972
Jul-13													7.5	1,909	13	1,050
Aug-13													7.6	2,060	9	1,150
Sep-13													7.5	1,237	70	748
Oct-13					7.2	1111	5440	1310					7.2	1,830	2	1,110
Nov-13					8.5	495	840	706	8.6	440	910	591	7.9	910	50	389
Dec-13					8.6	2700	45	1500	8.1	1670	4190	1300	7.8	1,150	7	662
Jan-14													7.3	1,772	86	957
Feb-14					8.5	662	1490	1850	9.2	609	2140	640	7.7	1,020	77	513
Mar-14					8.4	453	234	792	8.4	350	224	676	7.8	343	412	988
Apr-14					7.9	435	170	675	7.8	502	408	601	7.3	600	48	356
May-14													8.5	892	30	597
Jun-14					8.6	1669	89	1130	8.8	1659	88	947	7.3	1,512	8	904
Jul-14									7.5	607	103	980	7.2	1,070	13	660
Aug-14					8	553	520	710	7.9	353	585	515	7.5	298	11	378

Note: Shaded cell indicates dry at the time of sampling. Blank cell indicates no available result.

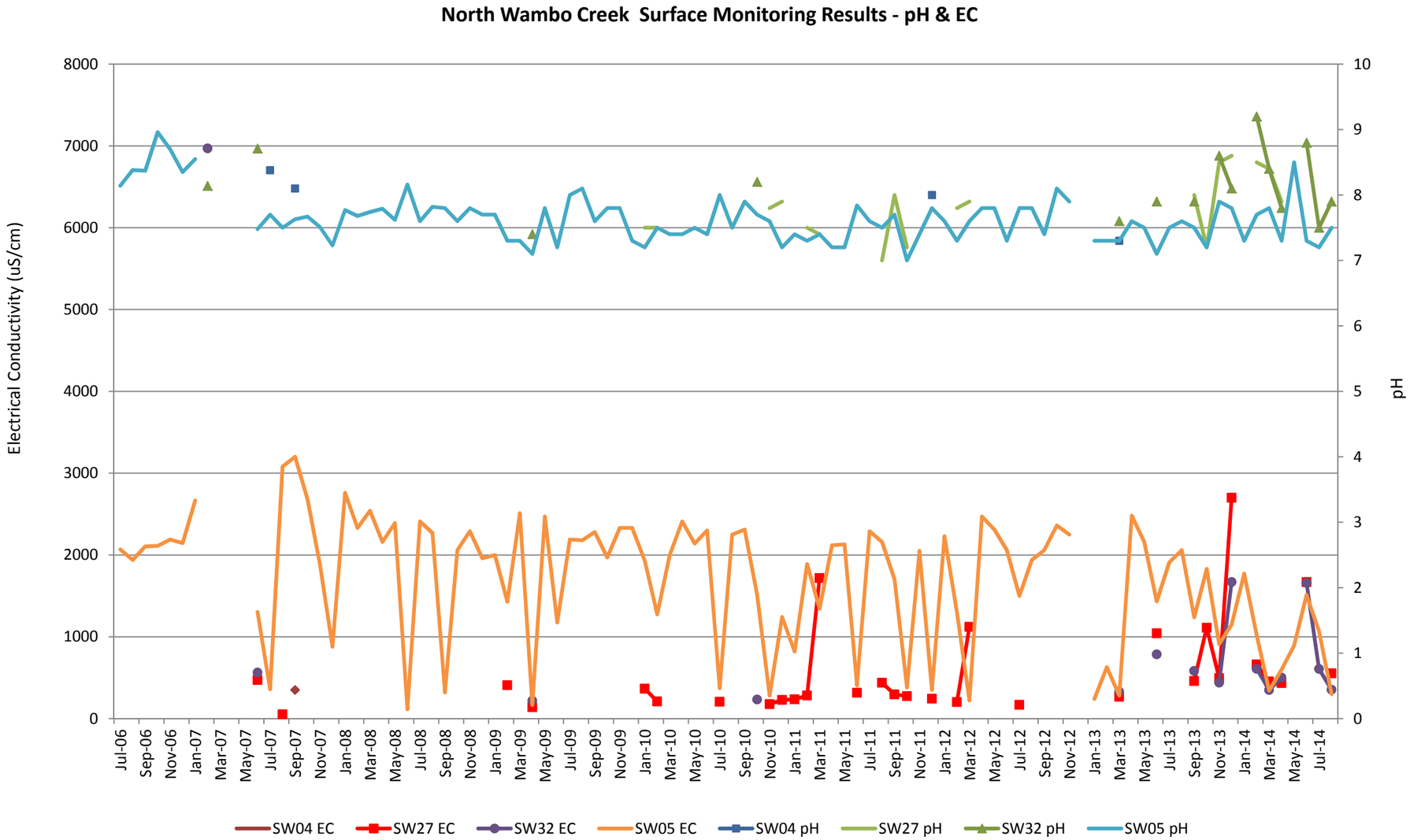
TABLE B **Surface water monitoring results for Stony Creek**

Month	SW07 - Stony Creek				SW08 - Stony Creek			
Criteria	6.0-9.5	492	120	N/A	6.0-9.5	492	120	N/A
	(SW07) pH	(SW07) EC (uS/cm)	(SW07) TSS (mg/L)	(SW07) TDS (mg/L)	(SW08) pH	(SW08) EC (uS/cm)	(SW08) TSS (mg/L)	(SW08) TDS (mg/L)
Jul-06								
Aug-06								
Sep-06								
Oct-06								
Nov-06								
Dec-06								
Jan-07								
Feb-07								
Mar-07								
Apr-07								
May-07								
Jun-07	8.08	281	12	218	8.44	301	1	204
Jul-07	7.6	**615**	10	388	7.5	477	1	240
Aug-07	7.9	354	**331**	174				
Sep-07	7.69	455	3	246	7.47	416	4	210
Oct-07								
Nov-07								
Dec-07	7.88	**535**	4	280	6.9	434	1	212
Jan-08							24	262
Feb-08								
Mar-08								
Apr-08								
May-08								
Jun-08								
Jul-08					6.2	479	1	256
Aug-08								
Sep-08					7.4	389	2	210
Oct-08					6.8	442	1	276
Nov-08								
Dec-08								
Jan-09								
Feb-09								
Mar-09	6.6	418	3	250	6.9	402	15	210
Apr-09	7	360	60	300	6.9	280	7	170
May-09					6.64	362	2	140
Jun-09	7.1	**615**	1	304				
Jul-09	6.8	**667**	1	306				
Aug-09								
Sep-09								
Oct-09								
Nov-09								
Dec-09								
Jan-10								
Feb-10								
Mar-10								
Apr-10								
May-10								
Jun-10								
Jul-10								
Aug-10								
Sep-10								
Oct-10								
Nov-10								
Dec-10	7.1	**680**	12	520	7.8	306	**<5**	238
Jan-11	7.4	428	42	438	7.2	290	**<5**	148
Feb-11								
Mar-11								
Apr-11					7.2	368	**<5**	58

Month	SW07 - Stony Creek				SW08 - Stony Creek			
Criteria	6.0-9.5	492	120	N/A	6.0-9.5	492	120	N/A
	(SW07) pH	(SW07) EC (uS/cm)	(SW07) TSS (mg/L)	(SW07) TDS (mg/L)	(SW08) pH	(SW08) EC (uS/cm)	(SW08) TSS (mg/L)	(SW08) TDS (mg/L)
May-11								
Jun-11					7.43	337	**<5**	238
Jul-11					7	294	<5	149
Aug-11					6.8	328	<5	185
Sep-11								
Oct-11	7.6	558	<5	280	6.6	358	<5	164
Nov-11	7.4	788	<5	400				
Dec-11	8.2	326	<5	145				
Jan-12	7.7	596	<5	376				
Feb-12	7.7	521	19	292				
Mar-12	7.6	243	29	178				
Apr-12	7.6	596	<5	290	7.1	402	<5	176
May-12	7.5	640	<5	312				
Jun-12	7.4	658	<5	388				
Jul-12	7.7	510	16	332				
Aug-12	7.4	705	1	369				
Sep-12	8	846	<5	392				
Oct-12								
Nov-12								
Dec-12								
Jan-13	7	159	72	176				
Feb-13	7.8	272	<1	152	7.4	250	<1	148
Mar-13	7.4	237	102	147				
Apr-13	7.9	627	<1	270	7.3	425	<1	203
May-13	8.2	614	<1	233				
Jun-13	7.4	632	2	355				
Jul-13	7.6	971	4	411				
Aug-13	7.6	800	3	363				
Sep-13	7.8	783	2	404				
Oct-13								
Nov-13	9.10	865	7	387				
Dec-13								
Jan-14								
Feb-14								
Mar-14	7.80	349	70	278				
Apr-14					7.40	298	8	168
May-14	8.20	572	20	309				
Jun-14	7.60	724	15	376				
Jul-14	7.80	647	31	330				
Aug-14								

Note: Shaded cell indicates dry at the time of sampling. Blank cell indicates no available result.

Figure 3a Surface water monitoring for North Wambo Creek



North Wambo Creek Surface Monitoring Results - TDS & TSS

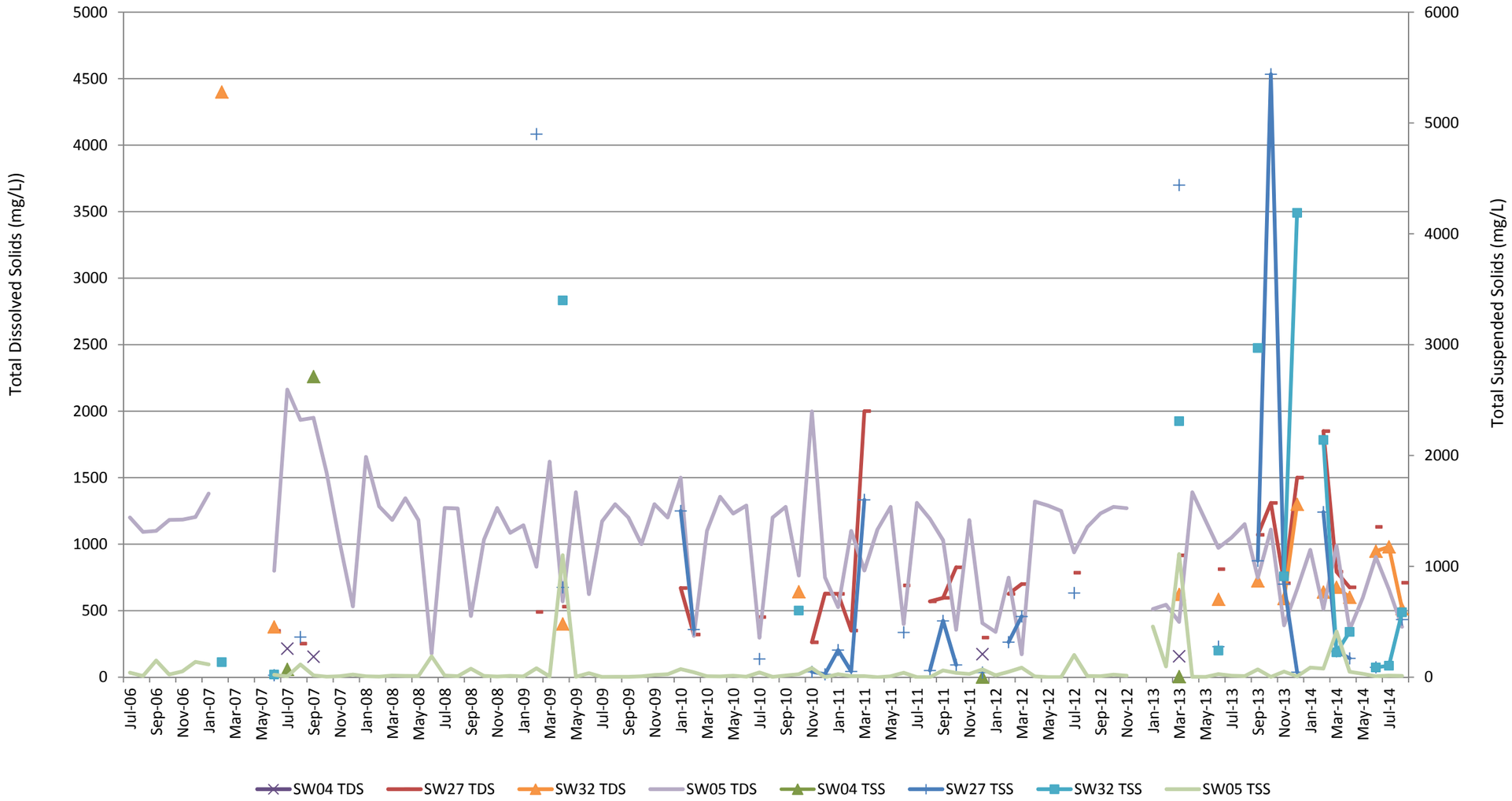
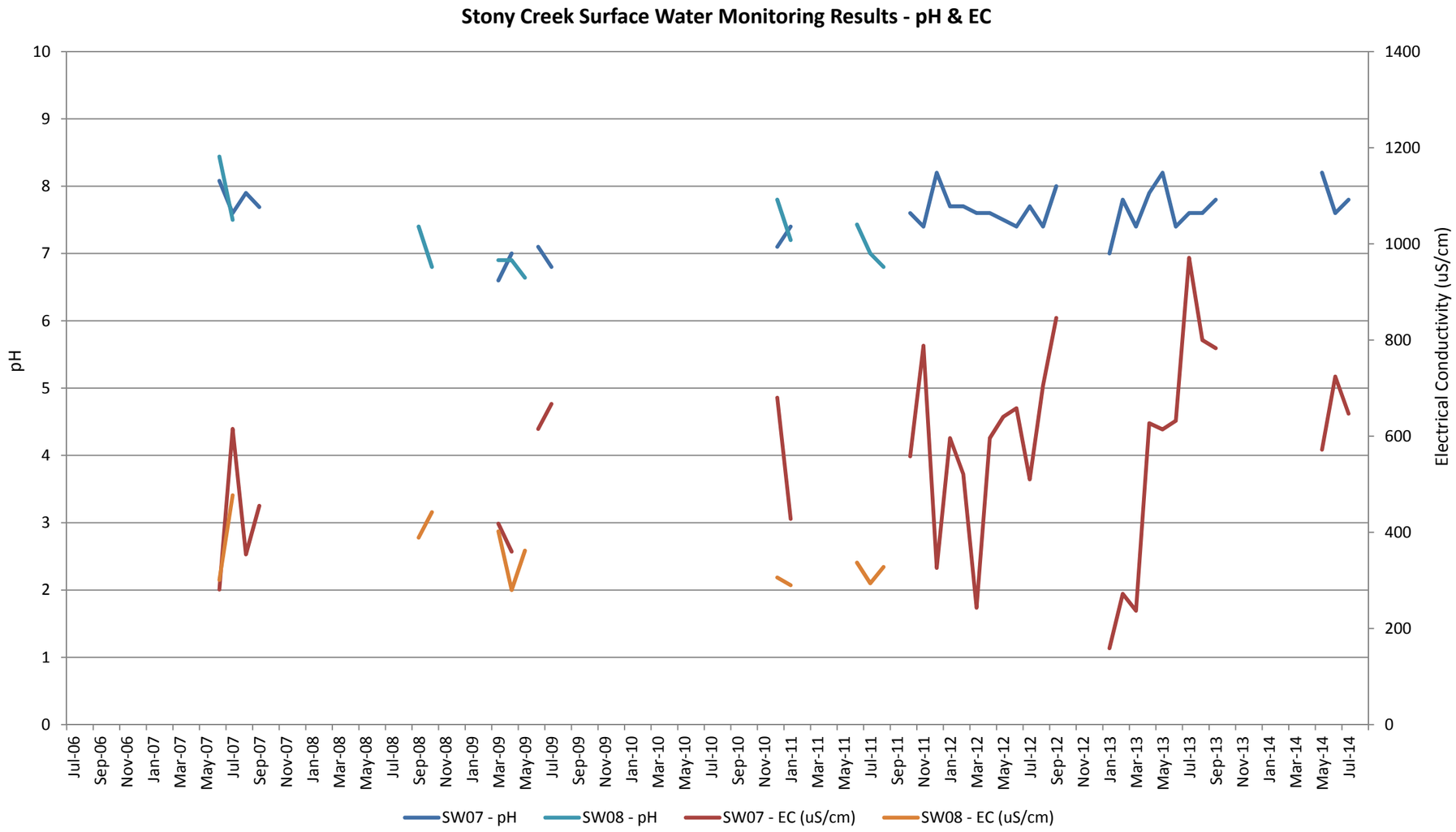
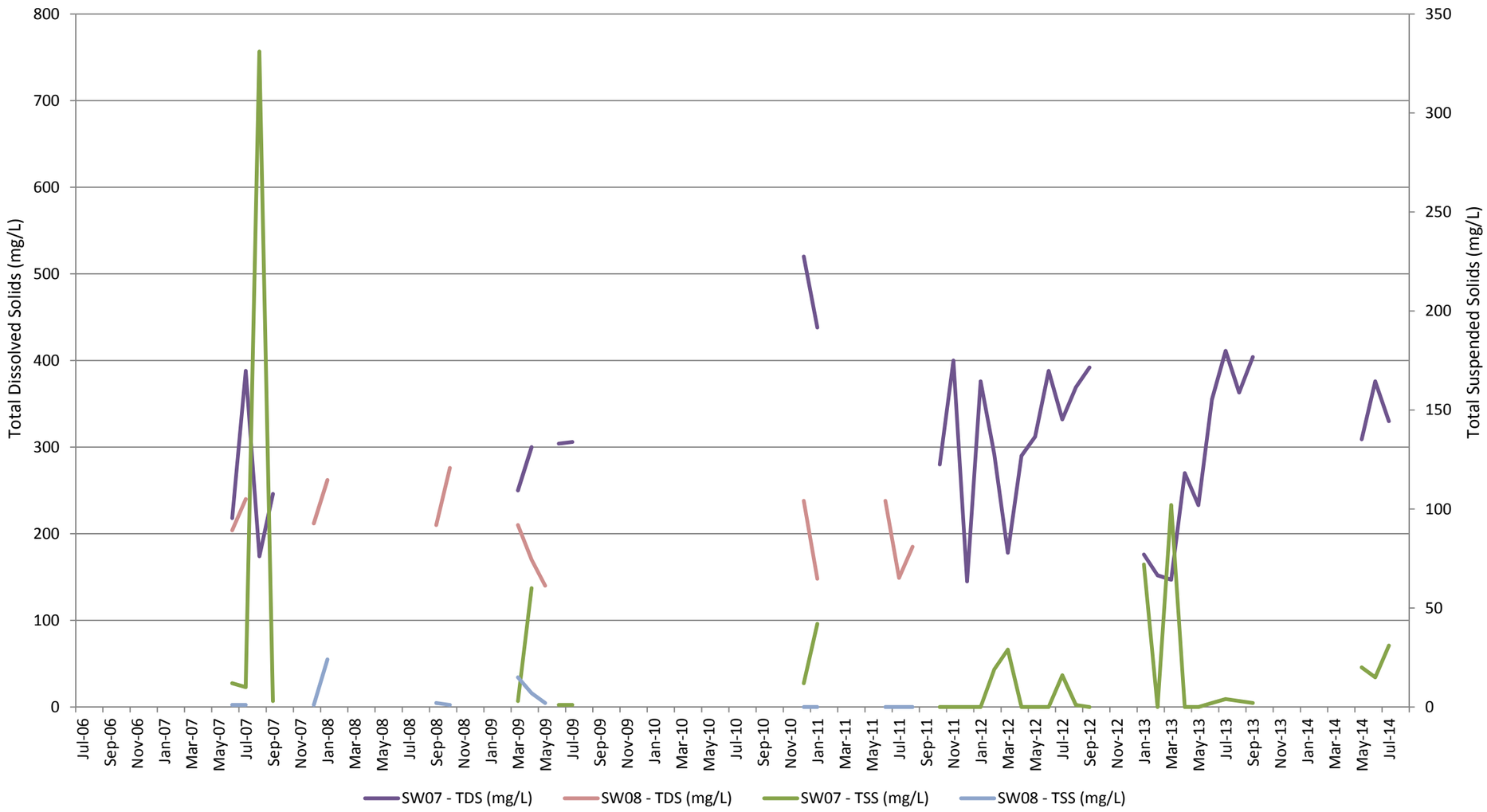


Figure 3b Surface water monitoring for Stony Creek



Stony Creek Surface Water Monitoring Results - TDS & TSS



WAMBO COAL

BED & BANK STABILITY SURVEYING

2013

SHEET 2 - STONY CREEK PLAN
SHEETS 3,4,5,6 - STONY CREEK CENTRELINE SECTIONS
SHEET 7 - STONY CREEK CROSS SECTIONS
SHEET 8 - SOUTH WAMBO CREEK CREEK PLAN
SHEETS 9,10 - SOUTH WAMBO CREEK CENTRELINE SECTIONS
SHEET 11,12 - SOUTH WAMBO CREEK CROSS SECTIONS
SHEET 13 - NORTH WAMBO CREEK PLAN
SHEETS 14,15,16,17,18 - NORTH WAMBO CREEK CENTRELINE SECTIONS
SHEET 19,20 - NORTH WAMBO CREEK CROSS SECTIONS
SHEET 21 - NORTH WAMBO CREEK DIVERSION PLAN
SHEETS 22,23,24,25 - NORTH WAMBO CREEK DIVERSION CENTRELINE SECTIONS
SHEET 26 - NORTH WAMBO CREEK DIVERSION CROSS SECTIONS

NOTES:

1. 2014 Survey undertaken by Lidar.
2. Lidar information supplied by Wambo Coal Pty Ltd (Peabody Energy).
3. Lidar measurements undertaken 23/02/2014.
4. Levels shown on the sections are subject to the limitations of the Lidar Survey.
5. It is noted that ongoing subsidence is occurring within the areas shown.
6. 2012 plans have been updated to show the ground profiles for 2014.

REVISIONS

REV.	DATE	BY	DESCRIPTION	CHK.	REV.	DATE	BY	DESCRIPTION	CHK.

Survey and Drafting Resources

St Patricks Commercial Centre
16 Cambridge Street
Singleton, NSW, 2330

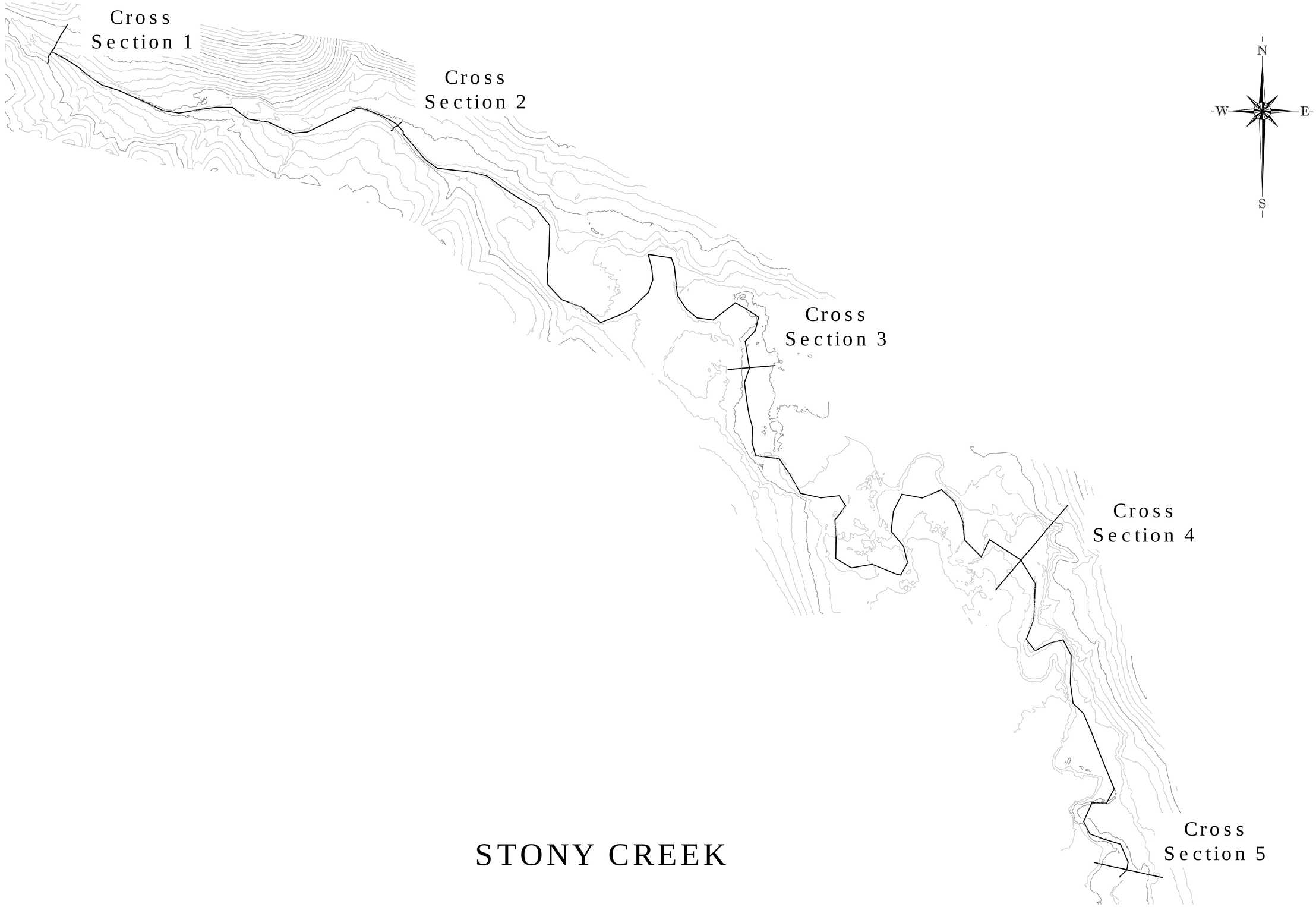
Website: www.sdresources.com.au

Wambo Coal Pty Ltd (Peabody Energy)

BED AND BANK STABILITY SURVEYING
TITILE SHEET & PLAN INDEX
SHEET 1 OF 26 SHEETS

Date	Scale:	Drawn	Checked	Approved
31.03.14	NA	JC	DR	MB

Job J000136
Dwg No. 09577
Rev. A
Sheet A1



STONY CREEK

REVISIONS										
REV.	DATE	BY	DESCRIPTION	CHK.	REV.	DATE	BY	DESCRIPTION	CHK.	

Survey and Drafting Resources

St Patricks Commercial Centre
16 Cambridge Street
Singleton, NSW, 2330

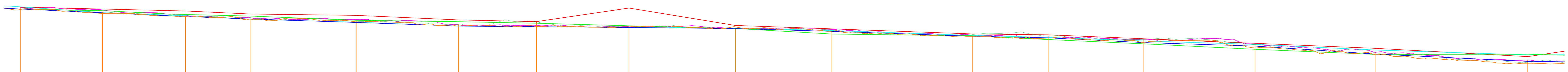
Website: www.sdresources.com.au

Wambo Coal Pty Ltd (Peabody Energy)

BED AND BANK STABILITY SURVEYING
STONEY CREEK PLAN
SHEET 2 OF 26 SHEETS

Date	Scale:	Drawn	Checked	Approved
31.03.14	1:2500	JC	DR	MB

Job	Dwg No.	Rev.	Sheet
J000136	09577	A	A1



STONY CK CL
DATUM: 74.00

CHAINAGE	2014	2012	2010	2009	2008	2007	2006
0	114.10	114.45	114.53	114.41	114.73	114.21	114.64
19.56	113.16	113.50	113.99	113.33	113.359	113.82	114.22
39.30	112.47	112.49	112.73	112.44	112.629	112.93	113.75
54.82	111.67	112.20	112.13	111.85	111.791	112.57	113.03
79.89	111.20	111.33	111.75	111.05	111.112	111.56	112.71
104.17	110.41	110.51	110.52	110.18	110.154	111.22	111.65
122.75	110.05	111.15	110.31	110.03	110.040	110.86	111.24
144.75	110.02	110.18	110.17	109.85	109.927	110.26	114.46
170.05	109.97	109.56	109.72	109.58	109.673	109.60	110.33
192.97	108.97	109.29	109.39	108.94	109.125	109.30	109.52
226.51	107.77	108.17	107.99	107.77	107.960	107.86	108.31
244.54	107.35	107.85	107.48	107.38	107.494	106.99	108.11
267.19	106.33	106.98	106.90	106.27	106.648	105.97	107.16
293.62	105.20	105.81	105.95	105.44	105.832	104.67	106.10
322.13	103.42	103.81	103.94	103.54	104.497	103.47	104.91
358.50	101.25	101.64	102.13	101.79	103.353	103.51	102.94

JOINS TO "A" BELOW

JOINS TO "A" ABOVE

CHAINAGE	2014	2012	2010	2009	2008	2007	2006
379.01	101.07	101.23	101.96	101.60	103.443	102.96	105.99
402.72		101.24	101.43		103.111	102.25	101.81
427.46		100.52	100.98		102.114	101.94	101.68
455.09	99.95	100.23	100.08	99.78	101.932	101.77	101.72
466.79	99.84	100.13	99.94	99.88	101.782	101.23	101.71
488.33	99.50	100.37	99.85	99.57	101.323	100.99	101.29
	99.15	99.45					
514.40	98.97	98.90	99.09	98.89	100.530	100.74	100.74
527.34	98.53	99.02	98.71	98.90	100.074	100.02	100.11
528.91	98.42	99.05	98.64	98.66	100.260	100.34	100.94
530.41	98.47	98.99	98.70	98.81	100.574	100.44	100.25
552.82	97.91	97.94	98.11	97.90	99.402	98.74	99.67
577.57	97.56	98.45	97.57	97.65	98.710	98.20	98.93
597.31	97.38	98.37	97.46	97.57	98.371	97.77	98.50
620.74	97.10	97.26	97.25	97.48	97.747	97.49	97.41
640.17	96.01	96.39	97.19	97.34	97.526	97.24	96.90
666.10	95.67	95.90	96.69	97.01	97.287	97.41	96.68
687.25	95.32	95.52	96.56	96.83	97.423	97.11	96.39
714.73	95.46	95.34	95.44	96.75	97.107	96.67	96.37
747.39	95.09	95.26	94.76	96.71	96.678	96.63	96.29

JOINS TO "B" ON THE NEXT SHEET

REVISIONS

REV.	DATE	BY	DESCRIPTION	CHK.	REV.	DATE	BY	DESCRIPTION	CHK.

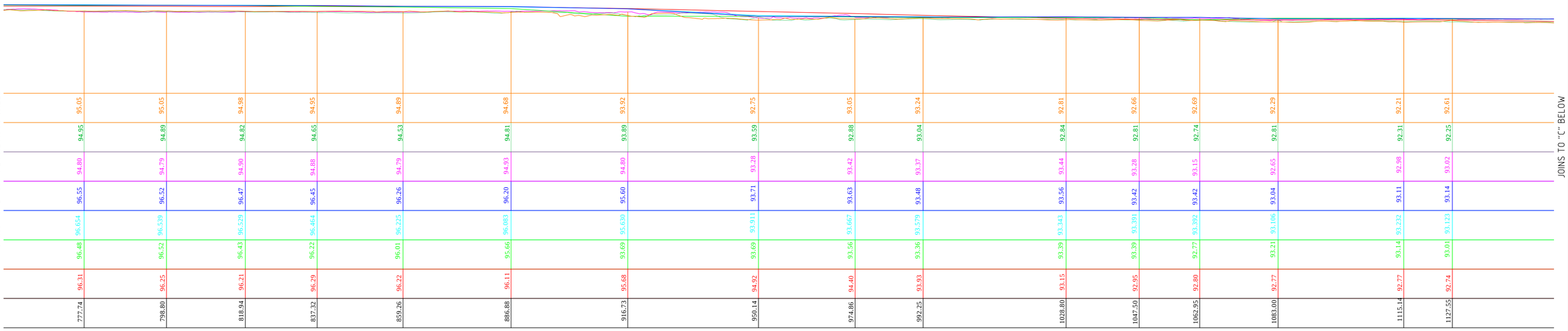
Survey and Drafting Resources
St Patricks Commercial Centre
16 Cambridge Street
Singleton, NSW, 2330
Website: www.sdresources.com.au

Wambo Coal Pty Ltd (Peabody Energy)

BED AND BANK STABILITY SURVEYING
STONEY CREEK LONGITUDINAL SECTION
SHEET 3 OF 26 SHEETS

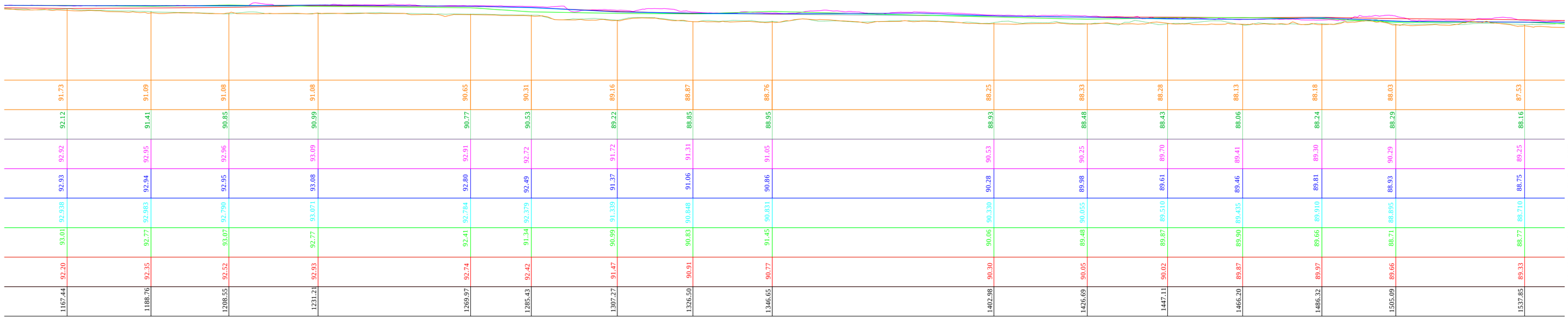
Date	Scale:	Drawn	Checked	Approved	Job	Dwg No.	Rev.	Sheet
31.03.14	H & V 1:500	JC	DR	MB	J000136	09577	A	A1

JOINS TO "B" ON THE PREVIOUS SHEET



JOINS TO "C" BELOW

JOINS TO "C" ABOVE



JOINS TO "D" ON THE NEXT SHEET

REVISIONS

REV.	DATE	BY	DESCRIPTION	CHK.	REV.	DATE	BY	DESCRIPTION	CHK.

Survey and Drafting Resources

St Patricks Commercial Centre
16 Cambridge Street
Singleton, NSW, 2330

Website: www.sdresources.com.au

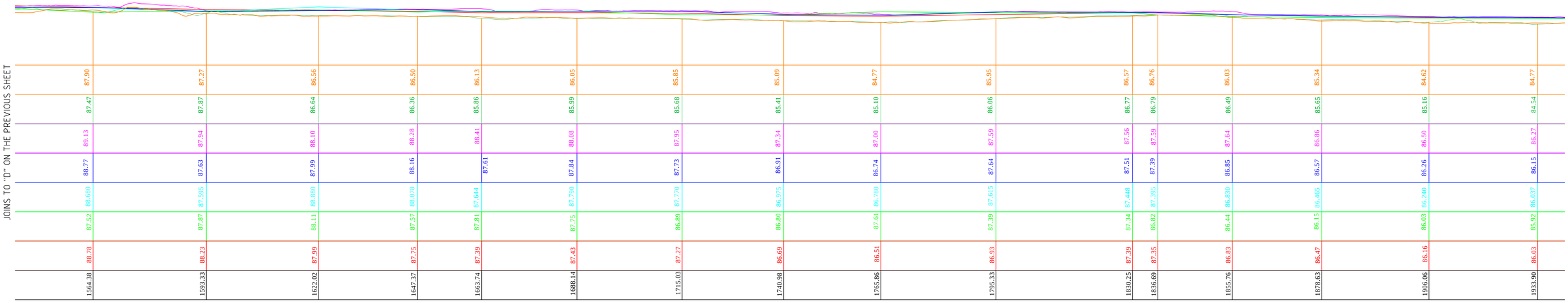
Wambo Coal Pty Ltd (Peabody Energy)

BED AND BANK STABILITY SURVEYING
STONEY CREEK LONGITUDINAL SECTION
SHEET 4 OF 26 SHEETS

Date	Scale:	Drawn	Checked	Approved
31.03.14	H & V 1:500	JC	DR	MB

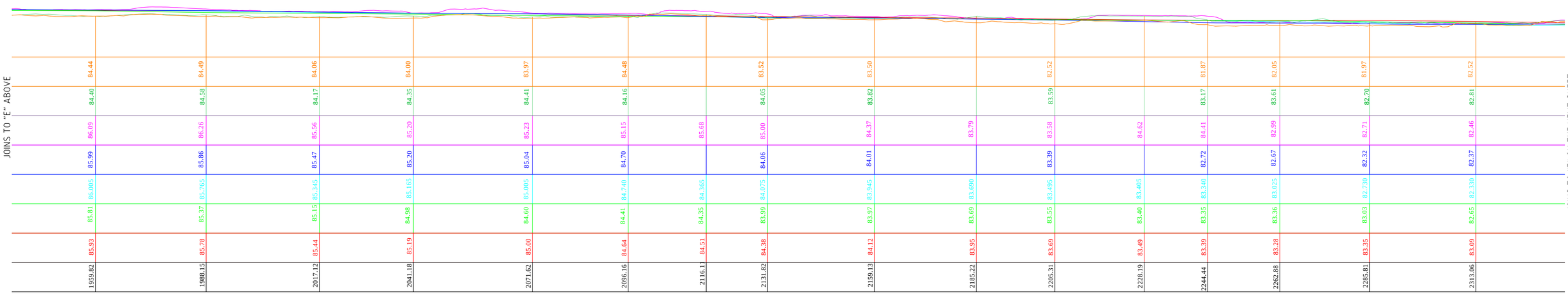
Job J000136
Dwg No. 09577
Rev. A
Sheet A1

JOINS TO "D" ON THE PREVIOUS SHEET



JOINS TO "E" BELOW

JOINS TO "E" ABOVE



JOINS TO "F" ON THE NEXT SHEET

REVISIONS

REV.	DATE	BY	DESCRIPTION	CHK.	REV.	DATE	BY	DESCRIPTION	CHK.

Survey and Drafting Resources

St Patricks Commercial Centre
16 Cambridge Street
Singleton, NSW, 2330

Website: www.sdresources.com.au

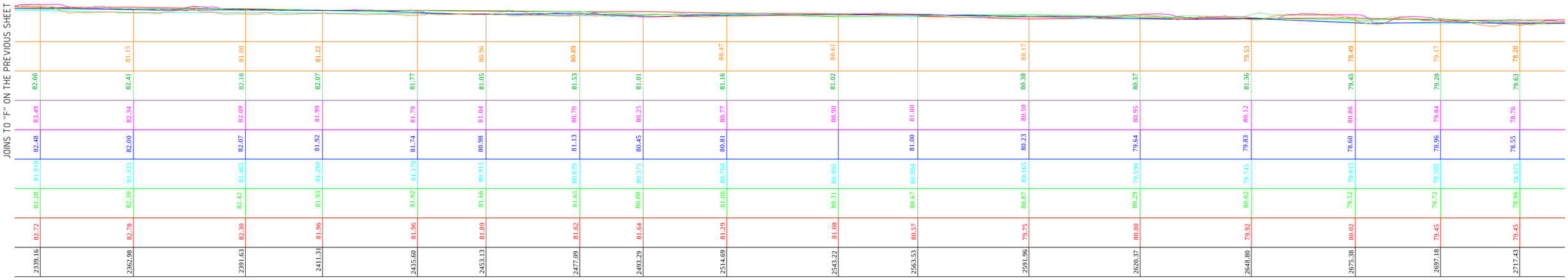
Wambo Coal Pty Ltd (Peabody Energy)

BED AND BANK STABILITY SURVEYING
STONEY CREEK LONGITUDINAL SECTION
SHEET 5 OF 26 SHEETS

Date	Scale:	Drawn	Checked	Approved
31.03.14	H & V 1:500	JC	DR	MB

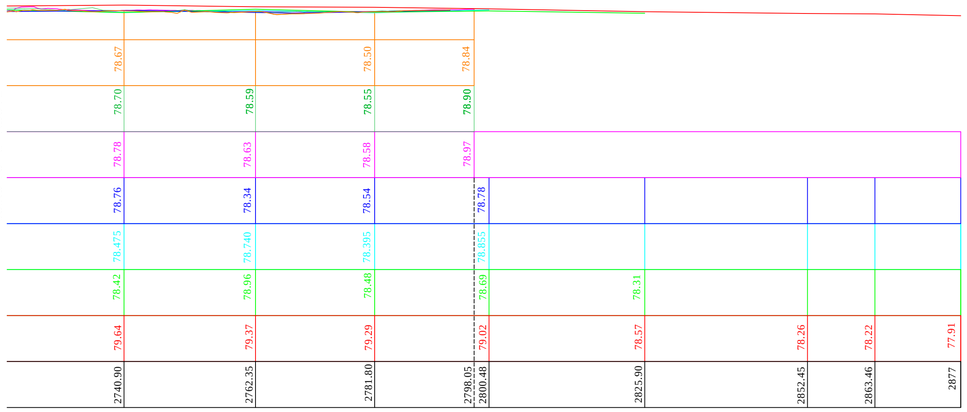
Job J000136
Dwg No. 09577
Rev. A
Sheet A1

JOINS TO "F" ON THE PREVIOUS SHEET



JOINS TO "G" BELOW

JOINS TO "G" ABOVE



REVISIONS

REV.	DATE	BY	DESCRIPTION	CHK.	REV.	DATE	BY	DESCRIPTION	CHK.

Survey and Drafting Resources

St Patricks Commercial Centre
16 Cambridge Street
Singleton, NSW, 2330

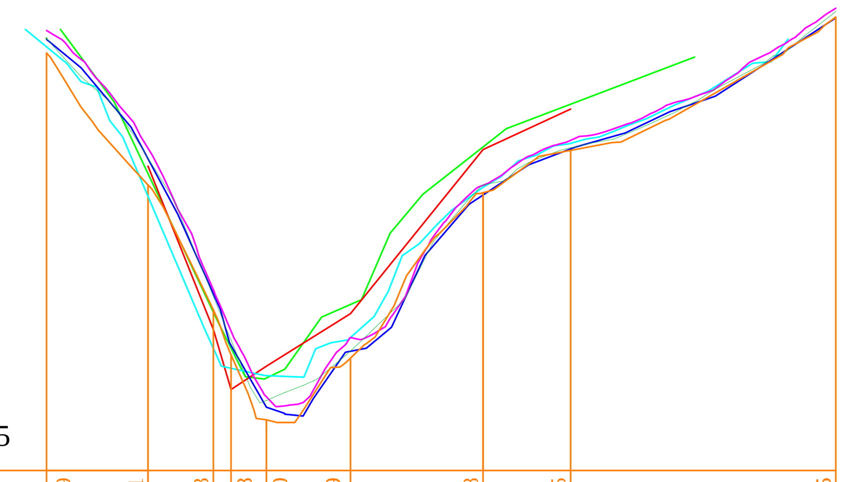
Website: www.sdresources.com.au

Wambo Coal Pty Ltd (Peabody Energy)

BED AND BANK STABILITY SURVEYING
STONEY CREEK LONGITUDINAL SECTION
SHEET 6 OF 26 SHEETS

Date	Scale:	Drawn	Checked	Approved
31.03.14	H & V 1:500	JC	DR	MB

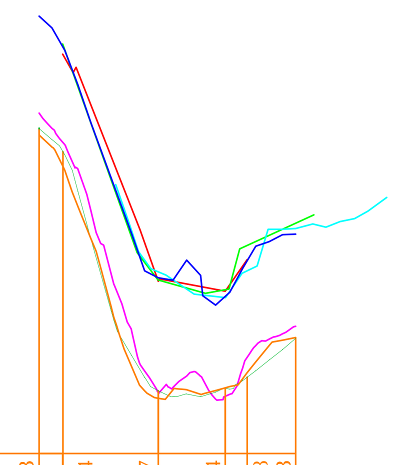
Job J000136
Dwg No. 09577
Rev. A
Sheet A1



DATUM 113.5

2014	120.09	118.01	116.03	115.38	114.30	115.19	117.88	118.55	120.65
2012	120.32	118.43	116.25	115.56	114.61	115.39	118.01	118.59	120.74
2010	120.45	118.59	116.36	115.70	114.66	115.60	118.00	118.71	120.80
2009		118.42	116.29	115.48	114.50	115.38	117.85	118.58	
2008		116.46	115.43	115.11	115.00	115.60	117.97	118.66	
2007		118.19	116.00	115.43	114.94	116.12	118.61	119.28	
2006		118.30	115.72	114.78	115.15	115.97	118.57	119.21	
CHAINAGE	-8.02	0.000	5.164	6.564	9.353	16.008	26.479	33.409	54.36

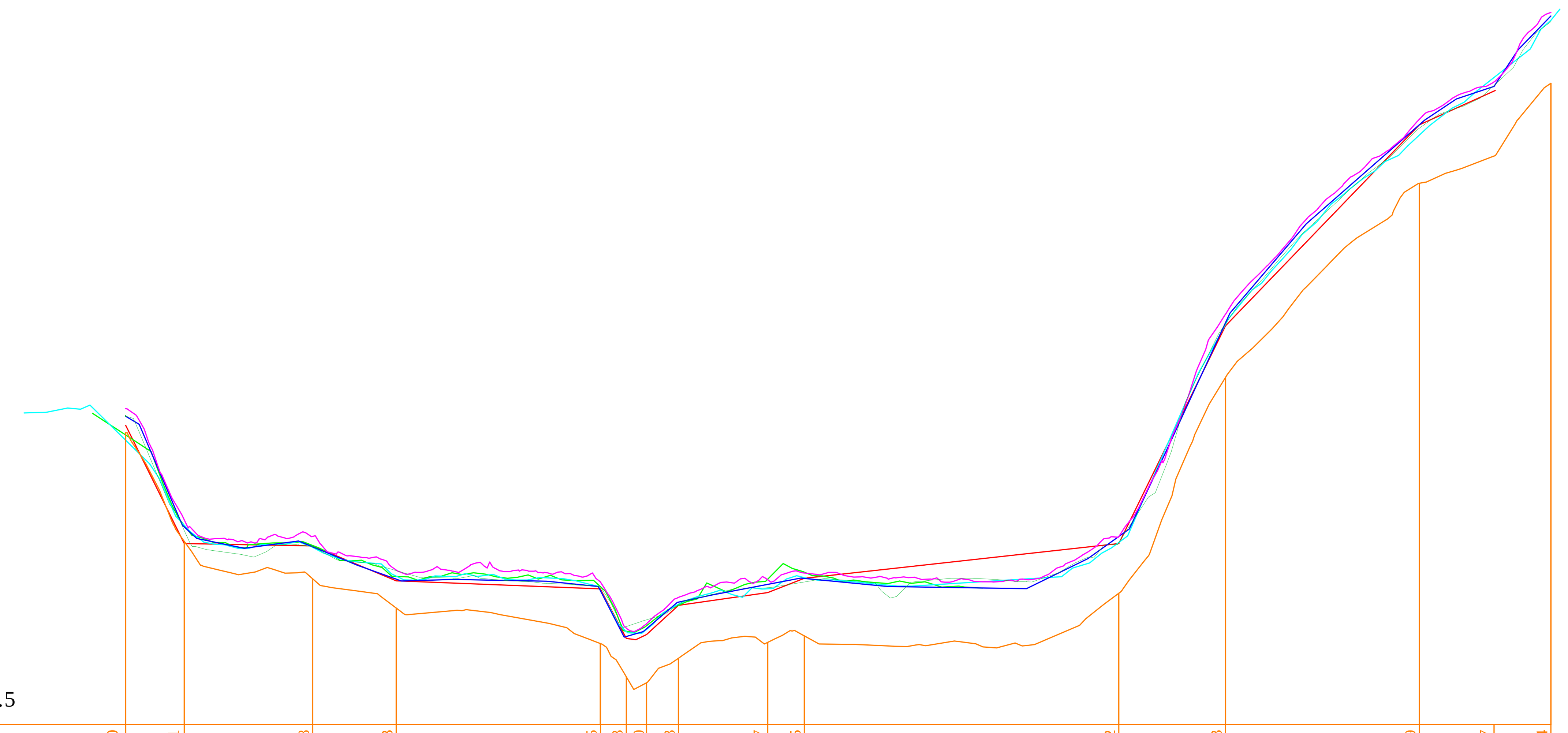
STONY CREEK SECTION 1



DATUM 98.00

2014	103.03	102.54	98.87	99.04	99.28	99.83
2012	103.13	102.77	98.99	99.03	99.21	99.82
2010	103.38	102.91	98.96	98.90	99.51	100.00
2009		104.42	100.78	100.48	101.05	
2008			101.79	100.48	100.98	
2007		104.47	100.74	100.59	101.29	
2006		104.31	100.72	100.56	101.06	
CHAINAGE	-1.87	0.000	7.540	12.836	14.569	18.39

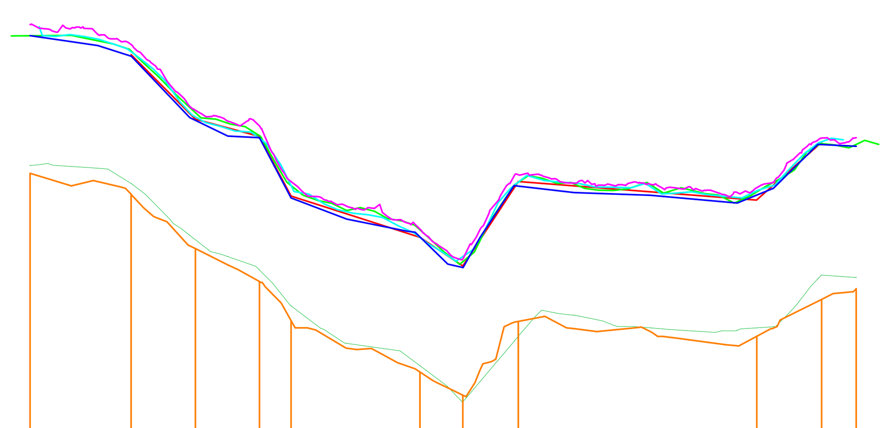
STONY CREEK SECTION 2



DATUM 81.5

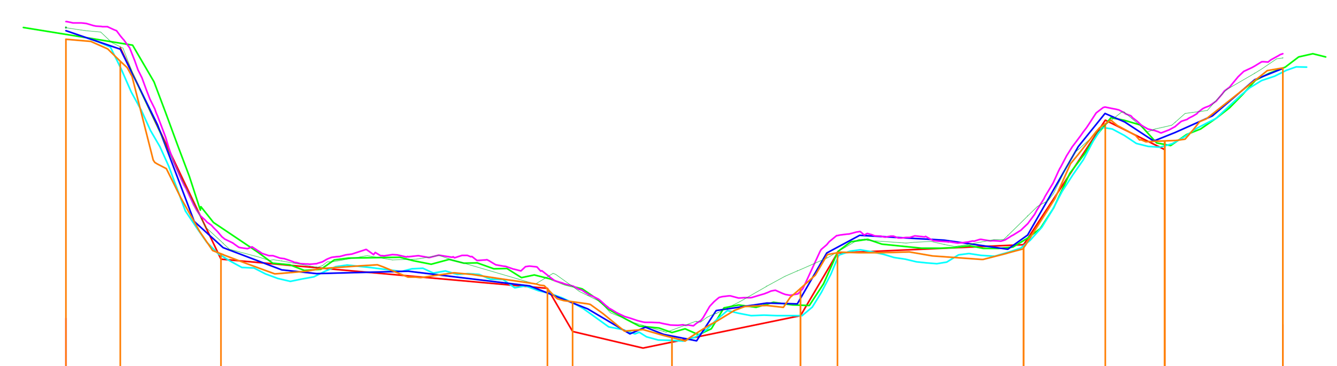
2014	87.80	85.51	84.68	83.93	83.25	82.53	82.40	82.93	83.27	83.45	84.62	89.13	93.19	93.77	95.34
2012	88.16	85.69	85.34	84.82	84.48	83.61	83.76	84.09	84.45	84.58	85.43	90.15	94.37	95.32	96.67
2010	88.32	85.91	85.56	84.83	84.58	83.58	83.67	84.24	84.63	84.77	85.56	90.35	94.57	95.39	96.87
2009	88.15	85.76	85.33	84.64	84.40	83.40	83.57	84.14	84.52	84.65	85.56	90.17	94.44	95.31	
2008	87.63	85.80	85.32	84.70	84.39	83.51	83.55	84.10	84.43	84.67	85.43	90.14	94.22	95.48	
2007	87.75	85.79	85.36	84.70	84.47	83.51	83.61	84.07	84.64	84.78					
2006	87.96	85.41	85.36	84.60	84.43	83.36	83.44	84.08	84.35	84.66	85.41	90.10	94.44	95.18	
CHAINAGE	0.000	6.340	20.196	29.212	51.248	54.059	56.230	59.691	69.310	73.267	107.220	118.737	139.668	147.848	153.861

STONY CREEK SECTION 4



DATUM 87.50

2014	91.94	91.61	90.75	90.23	89.61	88.85	88.43	89.59	89.43	89.75 / 89.92	90.12
2012	92.07	91.78	90.89	90.41	89.84	88.90	88.34	89.37	89.50	90.33	90.29
2010	94.29	93.98	92.94	92.70	91.81	91.06	90.59	91.92	91.71	92.50	92.50
2009		93.80	92.78	92.51	91.55	90.94	90.45	91.74	91.60	92.40	
2008		93.86	92.83	92.54	91.75	90.93	90.63	91.80	91.66	92.44	
2007		93.87	92.90	92.54	91.75	91.05	90.54	91.80	91.65	92.41	
2006		93.82	92.80	92.52	91.58	90.93	90.48	91.81	91.52	92.43	
CHAINAGE	-7.97	0.000	5.084	10.118	12.638	22.829	26.215	30.598	49.415	54.535	57.28



DATUM 77.5

2014	83.08	82.74	79.68	79.14	78.93	78.40	79.10	79.66	79.88	81.74	81.47	81.90	82.63
2012	83.26	82.96	79.89	79.33	79.17	78.49	79.44	79.72	80.23	81.72	81.70		82.79
2010	83.36	83.14	79.97	79.35	79.18	78.56	79.10	79.98	80.10	82.01	81.62		82.85
2009		82.93	79.82	79.07	78.91	78.39	78.99	79.80	79.94	81.91	81.54		
2008		82.63	79.67	79.07	78.92		78.72	79.62	79.82	81.68	81.40		
2007		83.02	80.11	79.30	79.17		78.88	79.72	79.90	81.73	81.42		
2006		82.95	79.61	79.14	78.46		78.72	79.70	79.83	81.80	81.34		
CHAINAGE	-4.30	0.000	7.950	33.749	35.736	43.597	53.761	56.668	71.375	77.838	82.529		91.87

STONY CREEK SECTION 5

REVISIONS									
REV.	DATE	BY	DESCRIPTION	CHK.	REV.	DATE	BY	DESCRIPTION	CHK.

Survey and Drafting Resources

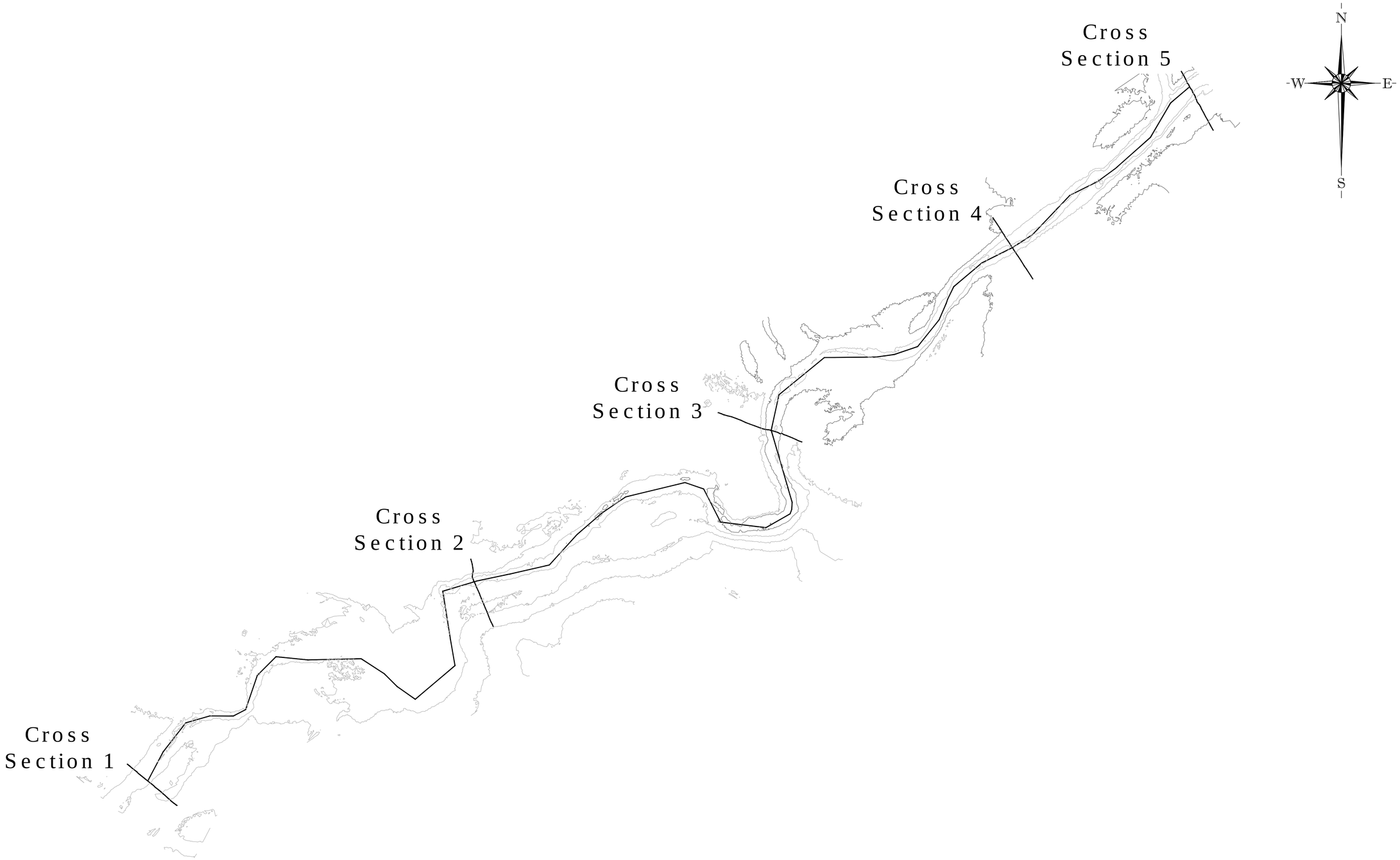
St Patricks Commercial Centre
16 Cambridge Street
Singleton, NSW, 2330

Website: www.sdresources.com.au

Wambo Coal Pty Ltd (Peabody Energy)

BED AND BANK STABILITY SURVEYING
STONEY CREEK CROSS SECTIONS
SHEET 7 OF 26 SHEETS

Date	Scale:	Drawn	Checked	Approved	Job	Dwg No.	Rev.	Sheet
31.03.14	H 1:500 V 1:100	JC	DR	MB	J000136	09577	A	A1



SOUTH WAMBO CREEK

REVISIONS										
REV.	DATE	BY	DESCRIPTION	CHK.	REV.	DATE	BY	DESCRIPTION	CHK.

Survey and Drafting Resources

St Patricks Commercial Centre
16 Cambridge Street
Singleton, NSW, 2330

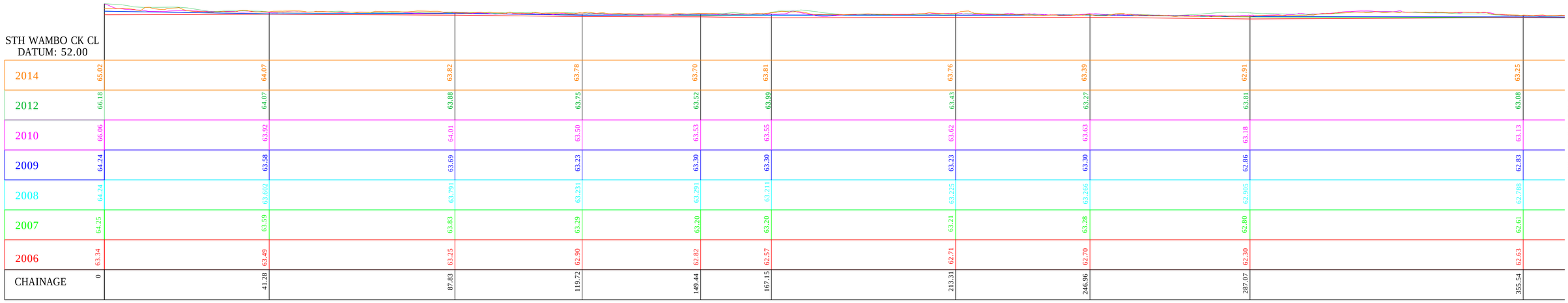
Website: www.sdresources.com.au

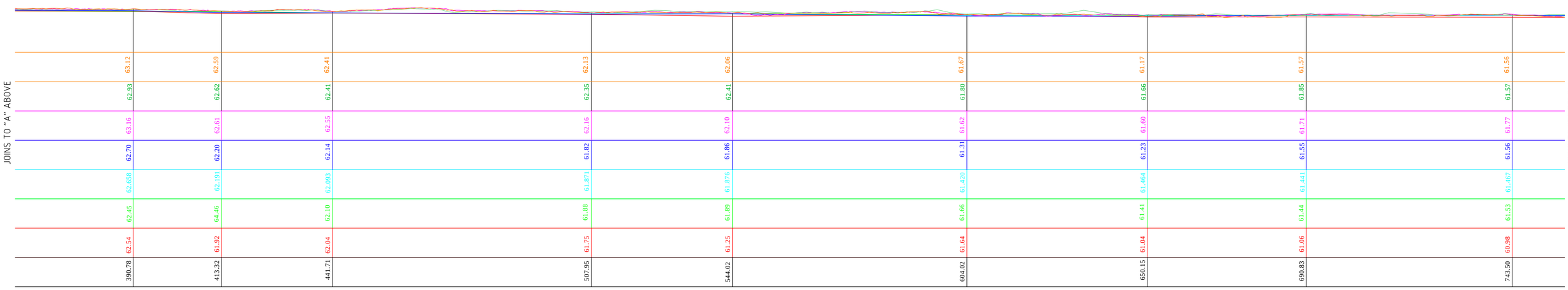
Wambo Coal Pty Ltd (Peabody Energy)

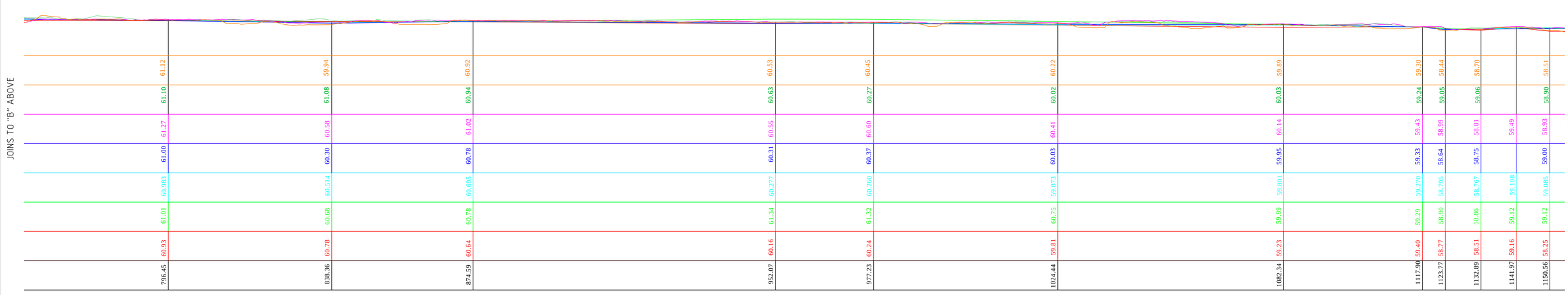
BED AND BANK STABILITY SURVEYING
SOUTH WAMBO CREEK PLAN
SHEET 8 OF 26 SHEETS

Date	Scale:	Drawn	Checked	Approved
31.03.14	1:2500	JC	DR	MB

Job J000136
Dwg No. 09577
Rev. A
Sheet A1







REVISIONS

REV.	DATE	BY	DESCRIPTION	CHK.	REV.	DATE	BY	DESCRIPTION	CHK.

Survey and Drafting Resources

St Patricks Commercial Centre
16 Cambridge Street
Singleton, NSW, 2330

Website: www.sdresources.com.au

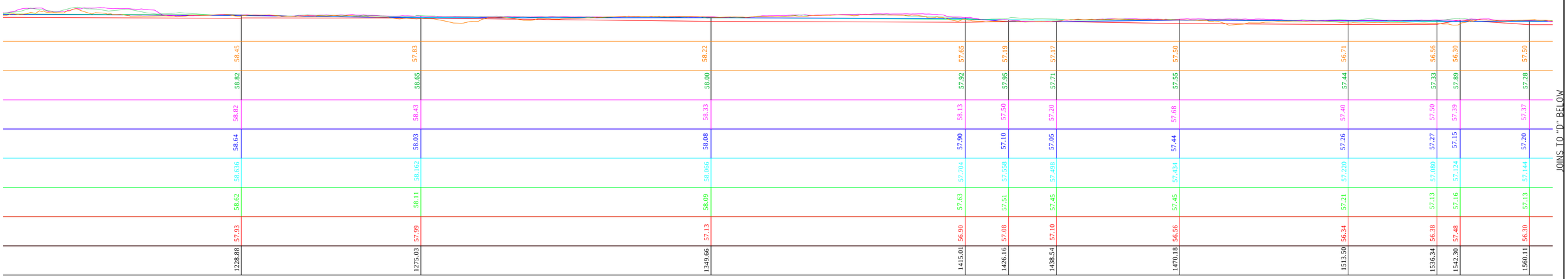
Wambo Coal Pty Ltd (Peabody Energy)

BED AND BANK STABILITY SURVEYING
SOUTH WAMBO CREEK LONGITUDINAL SECTION
SHEET 9 OF 26 SHEETS

Date	Scale:	Drawn	Checked	Approved
31.03.14	H & V 1:500	JC	DR	MB

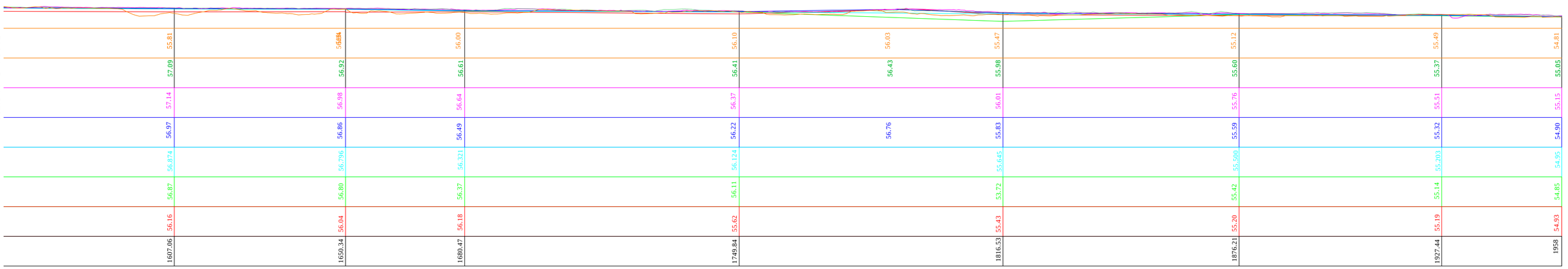
Job J000136
Dwg. No. 09755
Rev. A
Sheet A1

JOINS TO "C" ON PREVIOUS SHEET



JOINS TO "D" BELOW

JOINS TO "D" ABOVE



REVISIONS

REV.	DATE	BY	DESCRIPTION	CHK.	REV.	DATE	BY	DESCRIPTION	CHK.

Survey and Drafting Resources

St Patricks Commercial Centre
16 Cambridge Street
Singleton, NSW, 2330

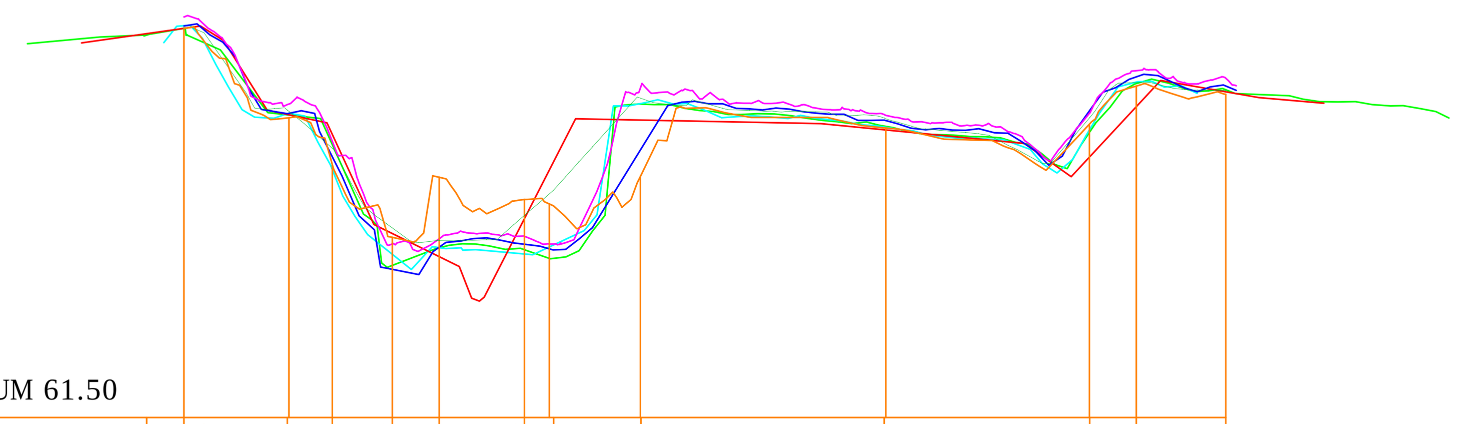
Website: www.sdresources.com.au

Wambo Coal Pty Ltd (Peabody Energy)

BED AND BANK STABILITY SURVEYING
SOUTH WAMBO CREEK LONGITUDINAL SECTION
SHEET 10 OF 26 SHEETS

Date	Scale:	Drawn	Checked	Approved
31.03.14	H & V 1:500	JC	DR	MB

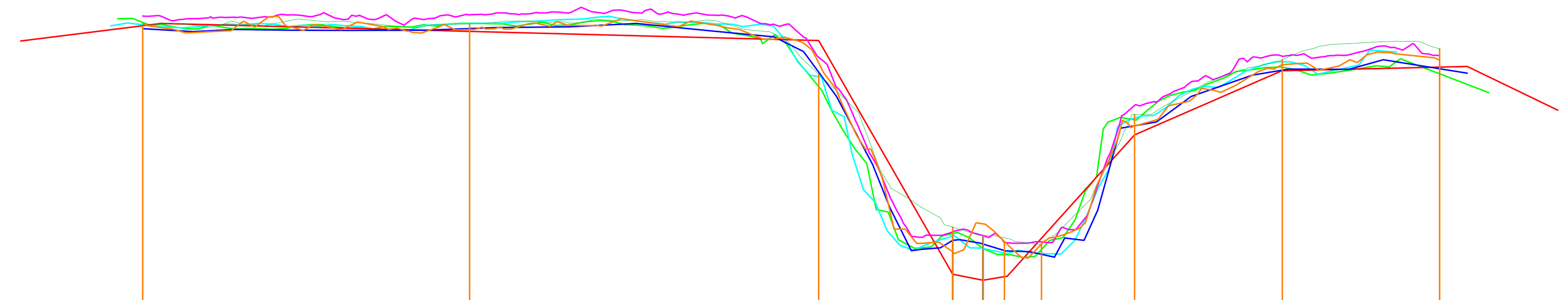
Job J000136
Dwg No. 09577
Rev. A
Sheet A1



DATUM 61.50

2014		67.64	66.23	65.49	64.34	65.29	64.94	64.87	65.32	66.07	66.14	66.73	66.60		
2012		67.64	66.34	65.75	64.49	64.30	64.70	65.03	66.54	66.22	66.23	66.79	66.66		
2010		67.82	66.45	65.85	64.24	64.32	64.36	64.24	66.73	66.27	66.31	66.98	66.86		
2009			66.30	65.61	63.84	64.19	64.24	64.16	65.74	66.19	66.34	66.88	66.73		
2008			66.31	65.41	64.08	64.18	64.08	64.19	66.45	66.08	66.04	66.79			
2007	67.54		66.27	65.80	63.90	64.18	64.15	64.01	66.44	66.09	66.00	66.77	66.67	66.48	66.42
2006	67.56		66.27	65.97	64.40	64.04	64.64	65.41	66.20	66.04	65.61	66.41	66.64	66.46	
CHAINAGE	0.000	2.93	11.229	14.666	19.399	23.099	29.847	31.816	39.040	58.400	74.484	78.182	85.250	93.030	98.149

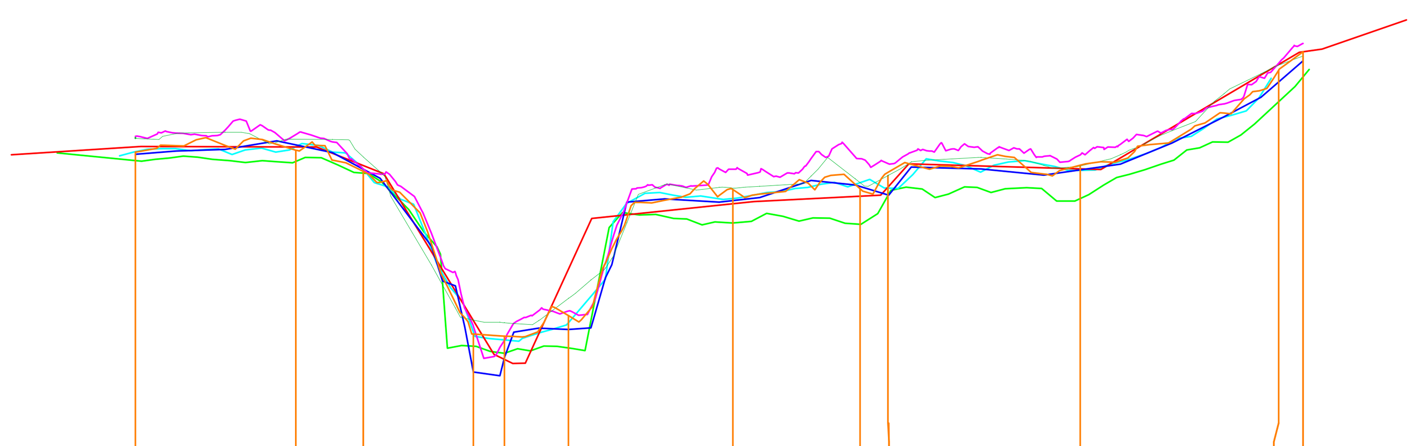
SOUTH WAMBO CREEK SECTION 1



DATUM 57.50

2014		62.46	62.31	61.76	58.45	58.94	58.62		60.66	61.73	61.81		
2012		62.42	62.45	61.56	58.87	58.72		58.58	60.85	61.81	62.01		
2010		62.59	62.61	61.86	58.78	58.72	58.59		61.01	61.88	61.89		
2009			62.37	61.60	58.63	58.57	58.45		60.65	61.63		61.58	
2008			62.45	61.52	58.71	58.49	58.40		60.79	61.78		61.70	60.85
2007			52.46	61.34	58.75	58.48	58.38		60.76	61.69		61.38	
2006	62.15		62.32	61.25	58.04	57.93	58.00		60.49	61.62		61.70	60.93
CHAINAGE	0.000	10.72	39.495	70.194	81.984	84.666	86.798		97.983	110.940	124.82	127.252	135.222

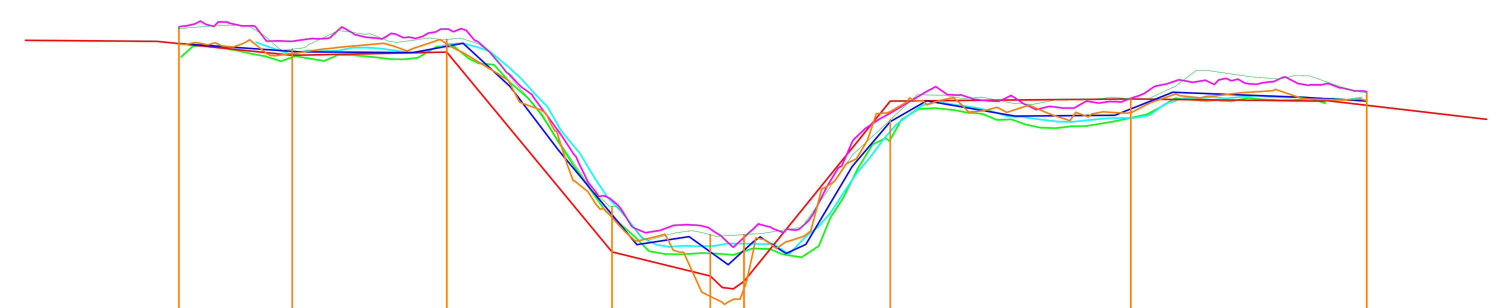
SOUTH WAMBO CREEK SECTION 3



DATUM 59.5

2014		64.38	64.42	64.08	61.51	61.47	61.80	63.79	63.80	64.07	64.18	65.68	65.97	
2012		64.60	64.59	64.31	61.73	61.68	62.10	63.81	63.90	64.01	64.17	65.76	65.90	
2010		64.63	64.66	64.12	61.63	61.40	61.87	64.11	64.28	64.21	64.33	65.79	66.09	
2009			64.50	64.11	60.91	61.15	61.58	63.62	63.84	63.71	64.10	65.49	65.81	
2008			64.47	64.12	61.54	61.42	61.73	63.65	63.90	63.81	64.10			
2007			64.238	64.05	61.31	61.20	61.28	63.26	63.23	63.70	63.65	65.18	65.54	
2006	64.34		64.47	64.17	61.72	61.10	62.62	63.57	63.67	63.83	64.11	65.77	65.98	66.36
CHAINAGE	0.000	9.81	22.501	27.819	36.519	38.979	44.240	57.030	67.078	69.284	84.476	100.157	101.958	108.618

SOUTH WAMBO CREEK SECTION 2



DATUM 55.50

2014		59.91	59.78	59.91	57.17	55.92	56.04	58.84	58.83	59.02	
2012		60.16	59.83	59.98	57.34	56.90	56.90	58.71	59.05	59.14	
2010		60.18	59.96	60.15	57.44	56.99	56.85	58.82	59.05	59.16	
2009			59.79	59.87	57.21	56.62	56.65	58.68	58.88		
2008			59.71	59.90	57.41	56.72	56.76	58.53	58.74		
2007			59.70	59.87	57.18	56.60	56.63	58.40	58.74		
2006	59.97		59.73	59.78	56.62	56.24	56.16	59.00	59.04		58.72
CHAINAGE	0.000	12.12	21.082	33.288	46.346	54.128	56.780	68.342	87.336	105.99	115.476

SOUTH WAMBO CREEK SECTION 4

REVISIONS

REV.	DATE	BY	DESCRIPTION	CHK.	REV.	DATE	BY	DESCRIPTION	CHK.

Survey and Drafting Resources
St Patricks Commercial Centre
16 Cambridge Street
Singleton, NSW, 2330

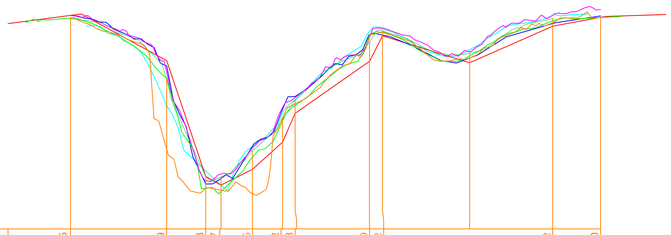
Website: www.sdresources.com.au

Wambo Coal Pty Ltd (Peabody Energy)

BED AND BANK STABILITY SURVEYING
SOUTH WAMBO CREEK CROSS SECTIONS
SHEET 11 OF 26 SHEETS

Date	Scale:	Drawn	Checked	Approved
31.03.14	H 1:500 V 1:100	JC	DR	MB

Job	J000136
Dwg No.	09755
Rev.	A
Sheet	A1



DATUM 53.50

2014		60.36	56.09	54.83	54.77	54.65	57.02	57.58	59.79	59.92	60.22	60.40			
2012		60.36	58.40	55.21	55.20	56.05	57.08	57.71	59.60	59.97	59.24	60.37			
2010		60.46	58.61	55.07	55.29	56.14	57.46	57.79	59.75	60.03	59.28	60.47	60.66		
2009			58.82	54.96	55.15	56.20	57.40	57.82	59.84	59.83	59.07	60.20			
2008			57.52	55.39	54.92	56.19	57.28	57.70	59.93	60.06	59.34	60.47			
2006	60.19		58.98	55.21	54.93	55.44	56.33	57.27	58.97	59.80	58.92	60.10		60.43	60.49
CHAINAGE	0.000	10.19	25.895	32.265	34.755	39.893	44.798	46.853	59.005	61.106	75.326	88.887	96.70	97.490	107.393

SOUTH WAMBO CREEK SECTION 5

REVISIONS									
REV.	DATE	BY	DESCRIPTION	CHK.	REV.	DATE	BY	DESCRIPTION	CHK.

Survey and Drafting Resources

St Patricks Commercial Centre
16 Cambridge Street
Singleton, NSW, 2330

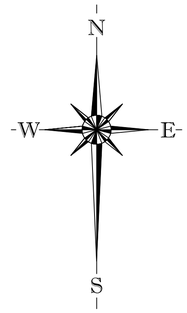
Website: www.sdresources.com.au

Wambo Coal Pty Ltd (Peabody Energy)

BED AND BANK STABILITY SURVEYING
SOUTH WAMBO CREEK CROSS SECTIONS
SHEET 12 OF 26 SHEETS

Date	Scale:	Drawn	Checked	Approved	Job
31.03.14	H 1:500 V 1:100	JC	DR	MB	J000136

Dwg No. 09755
Rev. A
Sheet A1



NORTH WAMBO CREEK

REVISIONS										
REV.	DATE	BY	DESCRIPTION	CHK.	REV.	DATE	BY	DESCRIPTION	CHK.	

Survey and Drafting Resources

St Patricks Commercial Centre
16 Cambridge Street
Singleton, NSW, 2330

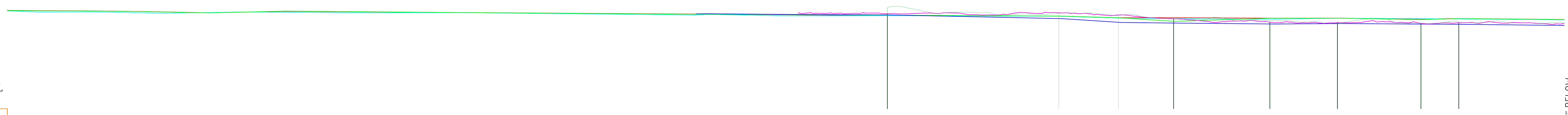
Website: www.sdresources.com.au

Wambo Coal Pty Ltd (Peabody Energy)

BED AND BANK STABILITY SURVEYING
NORTH WAMBO CREEK PLAN
SHEET 13 OF 26 SHEETS

Date	Scale:	Drawn	Checked	Approved
31.03.14	1:2500	JC	DR	MB

Job J000136
Dwg No. 09755
Rev. A
Sheet A1



NTH WAMBO CK CL
DATUM: 56.00

REMOVED DUE TO DIVERSION

2014									
2012									
2010									78.54
2009							78.34	78.37	78.22	
2008	79.07	78.81	78.60	78.67	78.73	78.64	78.08	78.24	77.89
2007	79.12	79.04	78.88	78.58	91.01	78.77	78.26	78.27	78.17
2006	79.14	79.06	78.92	78.60	78.94	78.67	78.30	78.28	78.12
CHAINAGE	0	17.87	31.42	47.41	65.34	106.88	161.85	165.01	182.88

2014									
2012		79.80	78.45	77.93	77.22	76.78	76.20	76.13	76.44
2010	78.54	78.41	78.58	78.10	77.18	76.37	76.31	76.11	76.26
2009		78.10	77.22	76.32	76.18	75.97	76.07		75.89
2008		77.95	77.78	77.38	77.23	77.10	77.32	77.21	77.16
2007		78.04	77.83	77.43	76.59	77.33	77.33	76.99	77.24
2006		77.95	77.84	77.45	77.46	77.34	77.35	77.14	77.25
CHAINAGE	185.81	206.78	247.06	261.05	274.03	296.66	312.52	332.15	341.04

JOINS TO "A" BELOW

REMOVED DUE TO DIVERSION

JOINS TO "A" ABOVE

76.45	76.11	76.85	76.66	76.06	75.41	75.86	75.85	75.70
76.43	75.83	76.83	75.18	75.19	75.43	75.21	75.46	75.30
75.49	75.61	74.98	74.14	74.13	74.27	74.47	75.86	75.84
76.86	76.94	76.41	75.33	75.19	75.08	75.22	75.84	75.90
76.91	77.03	76.29	75.46	75.18	75.21	75.22	75.93	75.91
76.93	77.02	76.26	74.92	74.94	74.96	75.17	75.99	75.91
378.33	405.77	455.06	500.48	517.07	558.96	579.25	601.52	615.56

75.96	76.60	77.00	76.90	75.74	75.77	74.78	75.24
75.85	76.05	75.77	75.76	76.03	75.92	74.50	75.26
75.81	75.89	76.11		75.99	75.94	75.89	75.64
75.89	75.93	75.85	75.99	76.01	75.82	75.90	75.32
75.87	75.98	75.88	75.97	75.99	75.83	75.90	75.28
75.81	75.95	75.83	75.98	76.03	75.81	75.89	75.28
635.75	653.70	668.31	672.14	696.49	721.87	739.09	759.04

JOINS TO "B" ON NEXT SHEET

REVISIONS									
REV.	DATE	BY	DESCRIPTION	CHK.	REV.	DATE	BY	DESCRIPTION	CHK.

Survey and Drafting Resources

St Patricks Commercial Centre
16 Cambridge Street
Singleton, NSW, 2330

Website: www.sdresources.com.au

Wambo Coal Pty Ltd (Peabody Energy)

BED AND BANK STABILITY SURVEYING
NORTH WAMBO CREEK LONGITUDINAL SECTION
SHEET 14 OF 26 SHEETS

Date	Scale:	Drawn	Checked	Approved	Job	Dwg No.	Rev.	Sheet
31.03.14	H & V 1:500	JC	DR	MB	J000136	09755	A	A1

JOINS TO "B" ON PREVIOUS SHEET

REMOVED DUE TO DIVERSION

74.13	73.89	75.22	75.01	74.98	74.95	781.40
74.24	73.67	74.59	74.63	74.59	74.63	797.56
74.32	73.61	74.49	74.58	74.51	74.56	822.22
74.46	73.63	74.73	74.75	74.72	74.69	840.48
73.95	73.62	74.98	74.93	74.90	74.86	858.90
74.19	73.61	75.14	75.08	75.04	75.03	867.46
73.93	73.78	75.60	75.58	75.49	75.42	889.48
74.28	74.26	75.60	75.61	75.55	75.48	908.76
74.53	74.35	75.60	75.60	75.61	75.56	926.58
75.06	74.97	75.51	75.51	75.45	75.37	944.73
75.57	74.67	75.47	75.47	75.41	75.35	962.98
75.46	74.77	75.01	75.03	74.94	74.97	979.54
74.99	74.30	75.04	75.05	75.01	75.03	998.17
74.42	74.42	75.00	75.04	75.02	74.95	1022.59
74.61	74.59	74.78	74.78	74.77	74.80	1043.14
-	-	-	74.58	74.56	74.62	1052.24
74.47	74.67	73.68	73.77	73.71	73.73	1052.95
-	74.67	73.51	73.60	73.64	73.65	1054.61
74.57	74.66	73.14	73.45	73.37	72.76	1055.54
-	-	-	73.18	73.17	72.70	1057.81
-	-	-	73.15	73.11	73.08	1058.10
74.31	74.65	73.54	73.54	73.49	73.06	1065.16
73.51	73.21	73.52	73.54	73.50	73.47	1075.58
73.46	73.53	73.35	73.32	73.31	73.37	1087.73
73.57	73.62	72.30	72.27	73.23	73.30	1105.30
72.63	72.40	72.79	72.67	72.74	73.22	1124.38
73.18	72.63	73.40	73.38	73.34	73.33	1140.05
72.88	73.58	73.29	73.32	73.29	73.17	1155.66

JOINS TO "C" BELOW

JOINS TO "C" ABOVE

REMOVED DUE TO DIVERSION

73.90	75.45	73.02	73.11	74.17	72.91	1183.62
71.77	73.06	72.78	72.87	73.86	72.58	1204.97
71.85	72.27	72.77	72.77	72.70	72.58	1246.18
71.65	71.72	72.78	72.81	72.89	72.74	1273.43
71.51	71.60	72.84	72.92	72.89	72.80	1299.07
71.44	71.63	72.49	72.51	72.48	72.46	1315.89
71.32	71.29	71.95	72.32	72.32	71.81	1332.49
71.09	70.92	72.23	72.29	72.19	72.25	1369.98
71.06	70.96	71.86	71.92	71.86	71.87	1386.84
70.84	70.69	71.81	71.84	71.75	71.80	1404.65
71.03	71.03	71.97	71.99	71.92	71.97	1417.54
70.85	70.58	71.93	71.99	71.92	71.95	1427.67
71.23	70.74	71.06	72.08	70.98	71.02	1443.19
72.49	69.92	71.00	71.11	71.11	71.12	1460.79
71.63	69.77	70.88	70.85	70.84	70.91	1478.94
71.41	70.71	71.25	71.03	71.04	71.00	1496.39
70.13	70.38	71.45	71.44	71.38	71.43	1511.64
70.09	70.36	71.24	71.31	71.39	71.29	1530.74
70.17	70.21	70.97	71.06	70.29	71.07	1544.91
70.12	69.85	71.01	70.82	70.95	70.82	1561.80

JOINS TO "D" ON NEXT SHEET

REVISIONS									
REV.	DATE	BY	DESCRIPTION	CHK.	REV.	DATE	BY	DESCRIPTION	CHK.

Survey and Drafting Resources
St Patricks Commercial Centre
16 Cambridge Street
Singleton, NSW, 2330
Website: www.sdresources.com.au

Wambo Coal Pty Ltd (Peabody Energy)

BED AND BANK STABILITY SURVEYING
NORTH WAMBO CREEK LONGITUDINAL SECTION
SHEET 15 OF 26 SHEETS

Date	Scale:	Drawn	Checked	Approved	Job	Dwg No.	Rev.	Sheet
31.03.14	H & V 1:500	JC	DR	MB	J000136	09755	A	A1

JOINS TO "D" PREVIOUS SHEET

REMOVED DUE TO DIVERSION

68.80 68.83 68.80 68.85 68.82

70.13	70.34	70.27	70.55	71.68	70.37	71.16	70.91	71.49	71.81	70.85	70.63	71.47	70.75	70.97	70.34	68.75	69.04	68.54	68.19	68.02	68.38
70.03	70.42	70.38	70.67	71.09	69.98	71.11	71.15	70.31	70.82	70.58	70.41	70.59	70.65	70.93	70.56	70.18	70.05	69.49	69.64	69.47	69.40
71.06	70.86	70.73	70.43	70.46	70.70	70.47	70.32		70.41	70.10	70.17	69.94	70.81	70.52	70.22	70.02	69.32	69.16	69.05	69.44	69.21
71.15	70.98	70.74	70.74	70.10	70.90	70.57	70.39	70.44	70.43	70.15	70.18	70.03	70.82	70.57	70.23	70.07	69.27	69.18	69.06	69.37	69.18
71.09	70.96	70.73	70.74	70.10	70.87	70.55	70.31	70.49	70.33	70.05	70.16	69.97	70.76	70.57	70.21	69.97	68.88	69.06	69.02	69.39	69.18
71.13	70.98	70.76	70.74	70.08	70.85	70.54	70.18	70.39	70.40	70.17	70.21	70.20	70.78	70.54	70.19	70.06	69.23	69.08	69.22	69.46	69.20
1574.10	1594.64	1602.55	1620.93	1638.85	1660.67	1680.69	1695.05	1707.51	1727.67	1744.03	1748.27	1762.16	1778.07	1797.73	1815.34	1832.59	1849.81	1866.41	1879.97	1905.85	1946.21

JOINS TO "E" BELOW

JOINS TO "E" ABOVE

68.77 68.75 68.68 68.67 68.75 68.72 68.68 68.58 68.61 68.50 68.49 68.50 68.45 68.21 67.41 66.97 66.97 66.99 66.88 66.82 66.76 66.85 66.84 66.73 66.62 66.67 66.67 66.73 66.70

67.97	68.11	67.57	67.35	67.60	67.84	68.17	68.61	69.03	68.40	68.46	68.06	67.97	67.71	67.74	67.96	67.93	67.94	67.87	68.38	67.47	67.06
69.46	69.38	69.10	68.84	69.09	68.74	68.82	68.80	68.76	68.54	68.05	67.88	68.31	67.74	67.82	67.66	67.78	67.65	67.65	67.65	67.34	67.11
69.29	68.77	68.66	68.98	68.75	68.38	68.45	68.61	68.61	68.22	67.78	67.66	67.31	67.80	67.56	67.55	67.39	67.77	67.58	67.36	67.09	66.16
69.29	68.71	68.65	68.96	68.71	68.28	68.45	68.65	68.57	68.13	67.82	67.14	67.25	67.73	67.51	67.47	67.47	67.59	67.50	67.37	67.01	66.22
69.29	68.72	68.66	68.96	68.70	68.28	68.40	68.62	68.57	68.12	67.94	67.07	67.22	67.69	67.43	67.42	67.35	67.53	67.05	67.27	66.93	66.13
69.32	68.74	68.69	68.98	68.73	68.32	68.60	68.66	68.58	68.15	68.05	67.17	67.32	67.76	67.47	67.47	67.45	67.58	67.27	67.34	66.96	66.26
1970.10	1983.33	2000.27	2011.33	2015.57	2031.93	2047.37	2062.43	2077.89	2092.92	2128.01	2156.91	2186.18	2195.18	2210.46	2221.22	2225.27	2236.25	2254.19	2271.48	2290.36	2334.76

JOINS TO "F" ON NEXT SHEET

REVISIONS								
REV.	DATE	BY	DESCRIPTION	CHK.	REV.	DATE	BY	DESCRIPTION	CHK.

St Patricks Commercial Centre
16 Cambridge Street
Singleton, NSW, 2330

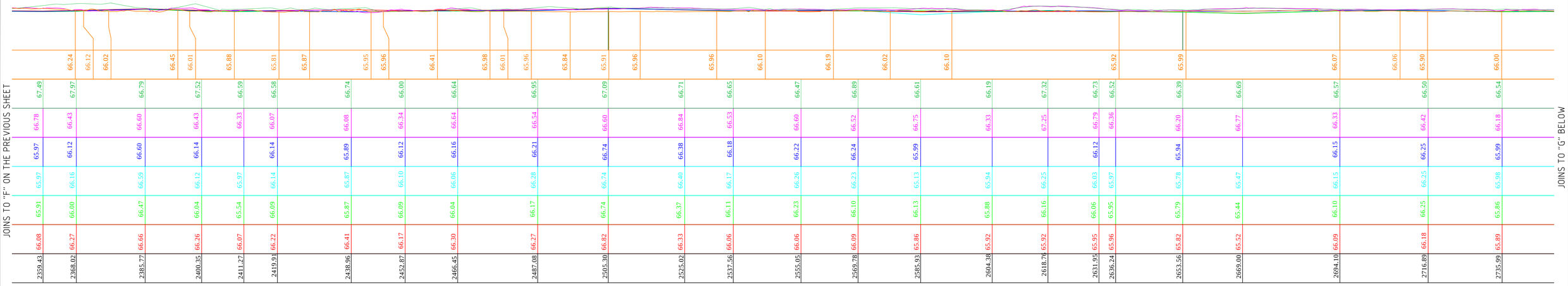
Website: www.sdresources.com.au

Wambo Coal Pty Ltd (Peabody Energy)

BED AND BANK STABILITY SURVEYING
NORTH WAMBO CREEK LONGITUDINAL SECTION
SHEET 16 OF 26 SHEETS

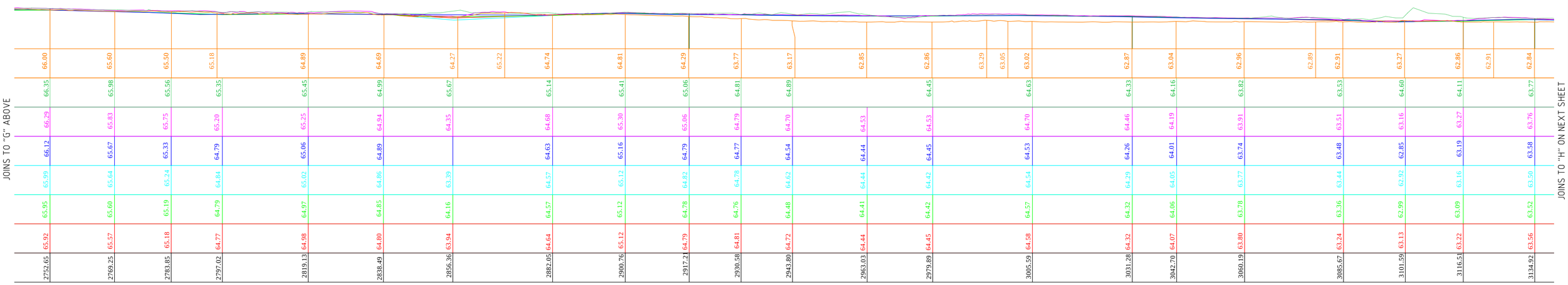
Date	Scale:	Drawn	Checked	Approved	Job	Dwg No.	Rev.	Sheet
31.03.14	H & V 1:500	JC	DR	MB	J000136	09755	A	A1

JOINS TO "F" ON THE PREVIOUS SHEET



JOINS TO "G" BELOW

JOINS TO "G" ABOVE



JOINS TO "H" ON NEXT SHEET

REVISIONS

REV.	DATE	BY	DESCRIPTION	CHK.	REV.	DATE	BY	DESCRIPTION	CHK.

Survey and Drafting Resources

St Patricks Commercial Centre
16 Cambridge Street
Singleton, NSW, 2330

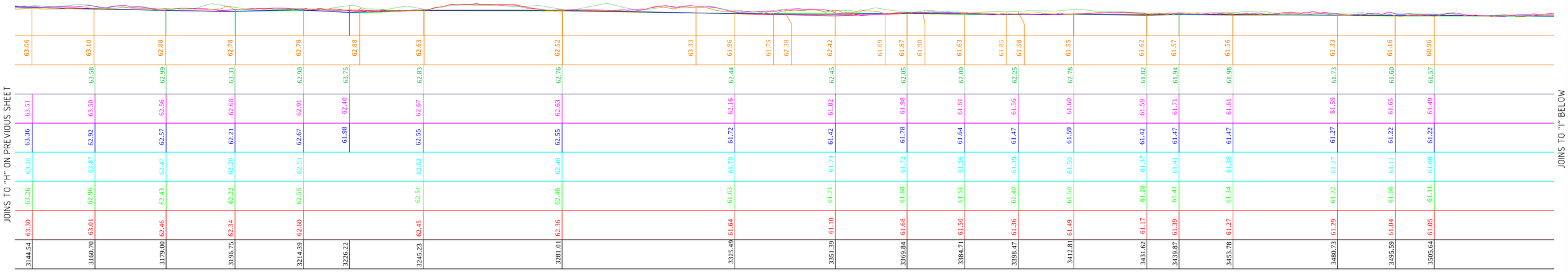
Website: www.sdresources.com.au

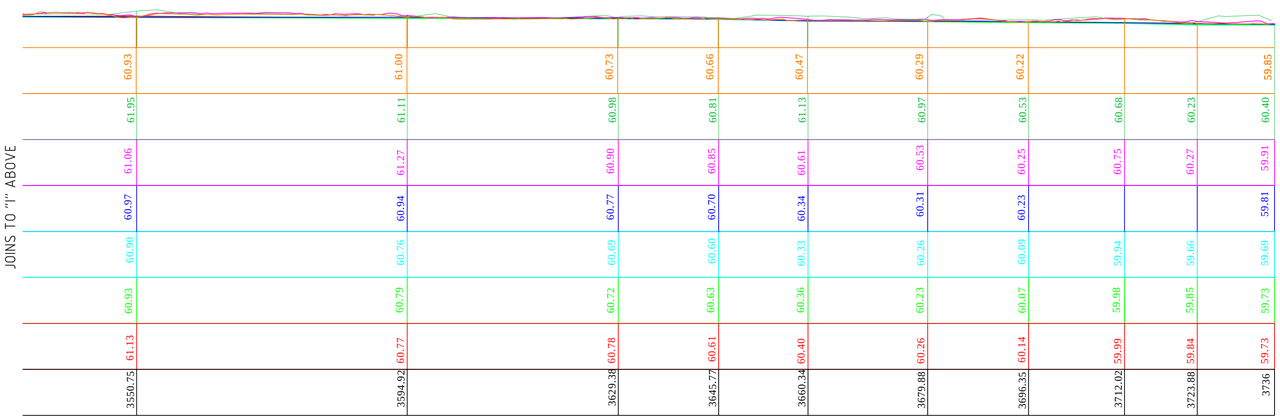
Wambo Coal Pty Ltd (Peabody Energy)

BED AND BANK STABILITY SURVEYING
NORTH WAMBO CREEK LONGITUDINAL SECTION
SHEET 17 OF 26 SHEETS

Date	Scale:	Drawn	Checked	Approved
31.03.14	H & V 1:500	JC	DR	MB

Job J000136
Dwg No. 09577
Rev. A
Sheet A1





REVISIONS

REV.	DATE	BY	DESCRIPTION	CHK.	REV.	DATE	BY	DESCRIPTION	CHK.

Survey and Drafting Resources

St Patricks Commercial Centre
16 Cambridge Street
Singleton, NSW, 2330

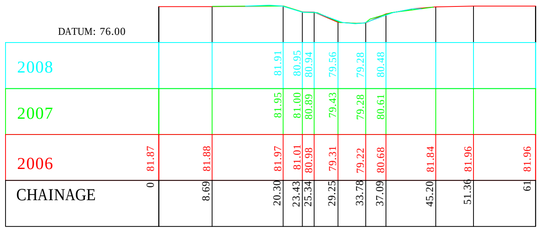
Website: www.sdresources.com.au

Wambo Coal Pty Ltd (Peabody Energy)

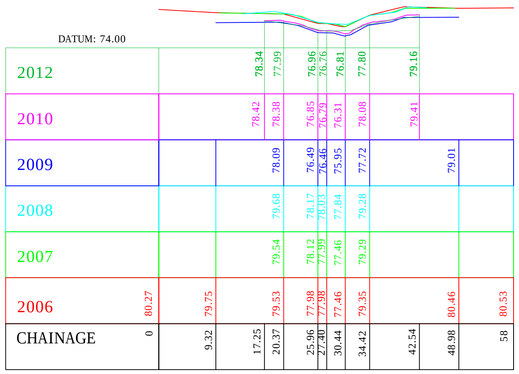
BED AND BANK STABILITY SURVEYING
NORTH WAMBO CREEK LONGITUDINAL SECTION
SHEET 18 OF 26 SHEETS

Date	Scale:	Drawn	Checked	Approved
31.03.14	H & V 1:500	JC	DR	MB

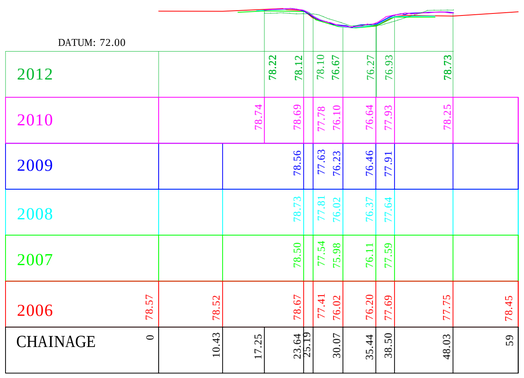
Job J000136
Dwg No. 09577
Rev. A
Sheet A1



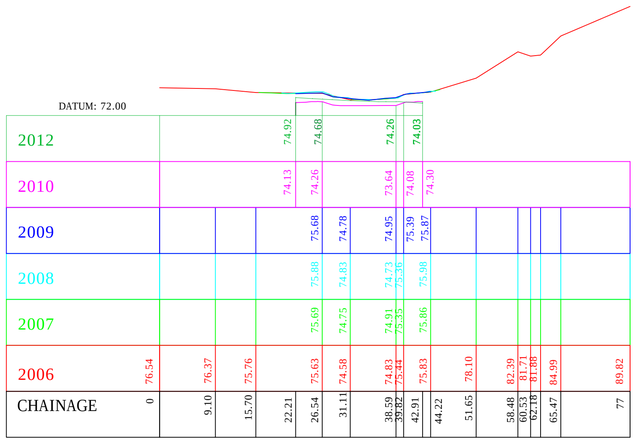
NTH WAMBO CREEK SECTION 1
(REMOVED DUE TO DIVERSION)



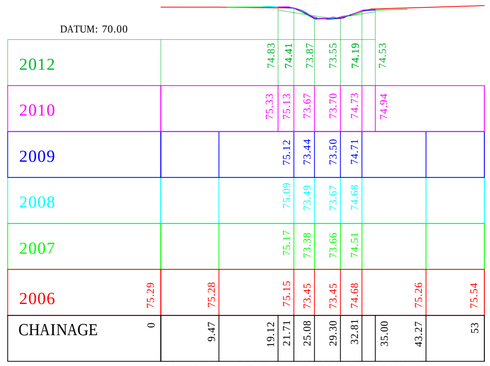
NTH WAMBO CREEK SECTION 2
(REMOVED DUE TO DIVERSION)



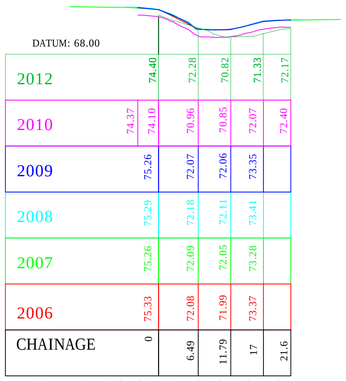
NTH WAMBO CREEK SECTION 3
(REMOVED DUE TO DIVERSION)



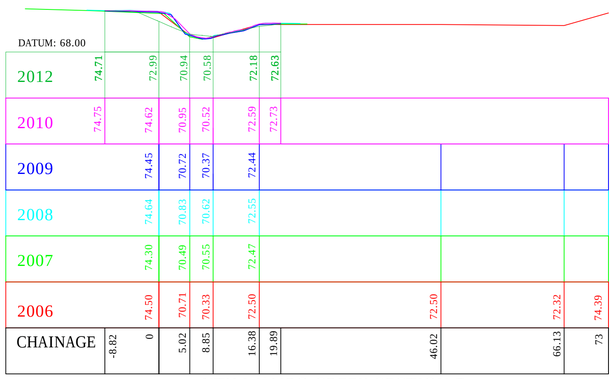
NTH WAMBO CREEK SECTION 4
(REMOVED DUE TO DIVERSION)



NTH WAMBO CREEK SECTION 5
(REMOVED DUE TO DIVERSION)



NTH WAMBO CREEK SECTION 6
(REMOVED DUE TO DIVERSION)



NTH WAMBO CREEK SECTION 7
(REMOVED DUE TO DIVERSION)

REVISIONS

REV.	DATE	BY	DESCRIPTION	CHK.	REV.	DATE	BY	DESCRIPTION	CHK.

Survey and Drafting Resources

St Patricks Commercial Centre
16 Cambridge Street
Singleton, NSW, 2330

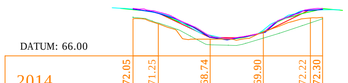
Website: www.sdresources.com.au

Wambo Coal Pty Ltd (Peabody Energy)

BED AND BANK STABILITY SURVEYING
NORTH WAMBO CREEK CROSS SECTIONS
SHEET 19 OF 26 SHEETS

Date	Scale:	Drawn	Checked	Approved
31.03.14	H 1:500 V 1:500	JC	DR	MB

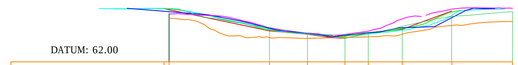
Job J000136
Dwg. No. 09577
Rev. A
Sheet A1



DATUM: 66.00

2014	72.05	71.25	68.74	69.90	72.22	72.30
2012	72.27	71.37	67.82	68.91	71.45	72.06
2010	73.75	73.16	69.27	69.92	73.63	73.74
2009	72.93		69.03	69.80	73.43	
2008	72.98		69.39	70.21	73.50	
2007	72.97		69.30	69.99	73.22	
2006	72.99		69.02	69.79	73.58	
CHAINAGE	-4.13	0	8.43	17.14	25	26.81

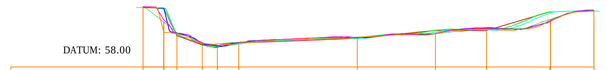
NTH WAMBO CREEK SECTION 8



DATUM: 62.00

2014	69.12	65.97	65.85	65.98	66.10	66.51	67.96	69.07
2012	70.65	67.61	66.65	66.46	66.68	67.80	69.42	70.17
2010	69.82	67.59	66.71	66.47	67.01	69.01	70.61	70.76
2009	70.26	67.47	66.65	66.33	66.77	67.58	67.20	
2008	70.74	67.35	66.57	65.91	66.54	67.19	67.57	
2007	70.69	67.21	66.57	66.19	66.73	67.44	70.14	
2006	70.69	67.07	66.51	65.85	66.73	67.33	70.30	
CHAINAGE	0	0.82	17.21	23.41	29.52	33.33	38.88	47	56.9

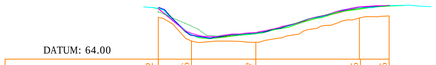
NTH WAMBO CREEK SECTION 11



DATUM: 58.00

2014	67.65	63.42	61.91	61.60	61.85	62.86	63.43	64.19	65.54	67.11
2012	67.70	65.29	63.69	61.79	62.03	62.72	63.39	64.22	65.77	67.18
2010	67.85	65.68	63.47	61.96	61.52	61.94	62.87	63.49	64.29	65.47	67.27
2009	67.60	63.53	61.88	61.51	61.99	62.81	63.44	64.39	65.61	
2008	67.50	63.36	61.86	61.37	61.73	62.65	63.70	64.09	66.80	
2007	67.55	63.37	61.74	61.44	61.99	62.81	64.01	64.07	66.99	
2006	67.56	63.12	61.59	61.22	61.91	62.66	63.96	63.95	67.02	
CHAINAGE	-3.39	0	2.14	6.28	8.73	12.23	31.47	44.33	52.66	63	70.2

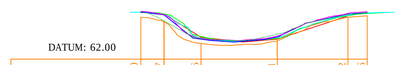
NTH WAMBO CREEK SECTION 14



DATUM: 64.00

2014	70.82	66.96	66.77	70.75	71.05
2012	71.68	69.39	68.24	72.30	72.71
2010	72.29	68.22	68.35	72.52	72.77
2009	72.46	67.91	68.29	72.53	
2008	72.28	68.02	68.20	72.43	
2007	72.22	68.01	68.15	72.17	
2006	72.22	67.93	68.14	72.46	
CHAINAGE	0	5.42	15.92	33	37.68

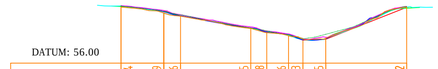
NTH WAMBO CREEK SECTION 9



DATUM: 62.00

2014	68.80	68.07	64.56	65.01	68.82	69.06
2012	69.57	68.23	65.39	66.07	69.28	69.58
2010	69.79	69.26	65.40	65.76	69.40	69.72
2009	69.21	65.26	65.60	69.33		
2008	69.25	65.42	65.56	69.10		
2007	69.37	65.70	65.39	69.04		
2006	69.36	65.55	65.25	68.99		
CHAINAGE	-3.78	0	6.03	18.48	30	33.16

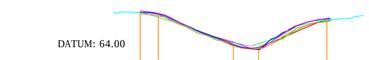
NTH WAMBO CREEK SECTION 12



DATUM: 56.00

2014	65.14	64.19	63.66	61.65	60.98	60.46	59.93	60.05	65.12	
2012	65.27	64.43	63.82	61.76	61.16	60.60	60.06	60.69	65.22	
2010	65.36	64.59	63.91	61.91	61.24	60.75	59.97	60.22	65.25	
2009	64.39	63.71	61.71	61.07	60.69	59.80	59.96	65.18		
2008	64.15	63.67	61.68	61.07	60.51	59.86	59.99	65.11		
2007	64.45	63.68	61.67	61.22	60.59	59.91	60.05	64.96		
2006	64.53	63.71	61.70	61.06	60.61	59.77	59.89	65.10		
CHAINAGE	-6.99	0	2.72	14.20	16.80	20.35	22.70	26.44	40	

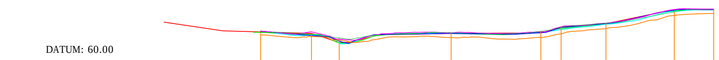
NTH WAMBO CREEK SECTION 15



DATUM: 64.00

2014	71.67	71.33	65.99	70.48	
2012	71.95	71.08	66.91	66.94	70.59
2010	72.09	71.71	67.03	66.13	70.90
2009	71.58	66.66	65.82	70.88	
2008	71.57	66.60	66.06	70.67	
2007	71.60	66.66	65.31	70.52	
2006	71.58	66.46	66.10	70.88	
CHAINAGE	-2.96	0	12.24	16.36	28

NTH WAMBO CREEK SECTION 10



DATUM: 60.00

2014		64.21	63.96	63.39	62.95	63.56	63.78	63.89	64.42	65.26	67.37	67.72
2012	64.65	64.34	63.72	63.58	64.20	64.58	64.82	65.45	66.14	67.92	68.34	
2010	64.81	64.72	63.53	63.37	64.31	64.57	64.72	65.54	66.15	68.37	68.43	
2009	64.12	63.23	63.13	64.27	64.47	64.58	65.43	66.08	68.27			
2008	64.19	62.92	63.03	64.25	64.52	64.68	65.08	65.94	68.01			
2007	64.31	62.94	63.02	64.15	64.45	64.65	65.26	66.04	68.15			
2006	66.31	64.88	64.46	62.99	63.14	64.23	64.47	64.55	65.47	66.05	68.36	
CHAINAGE	0	9.58	15.76	24.07	28.59	30.78	35.09	46.86	61.51	64.81	72.13	83	89.72

NTH WAMBO CREEK SECTION 13

REVISIONS

REV.	DATE	BY	DESCRIPTION	CHK.	REV.	DATE	BY	DESCRIPTION	CHK.

Survey and Drafting Resources

St Patricks Commercial Centre
16 Cambridge Street
Singleton, NSW, 2330

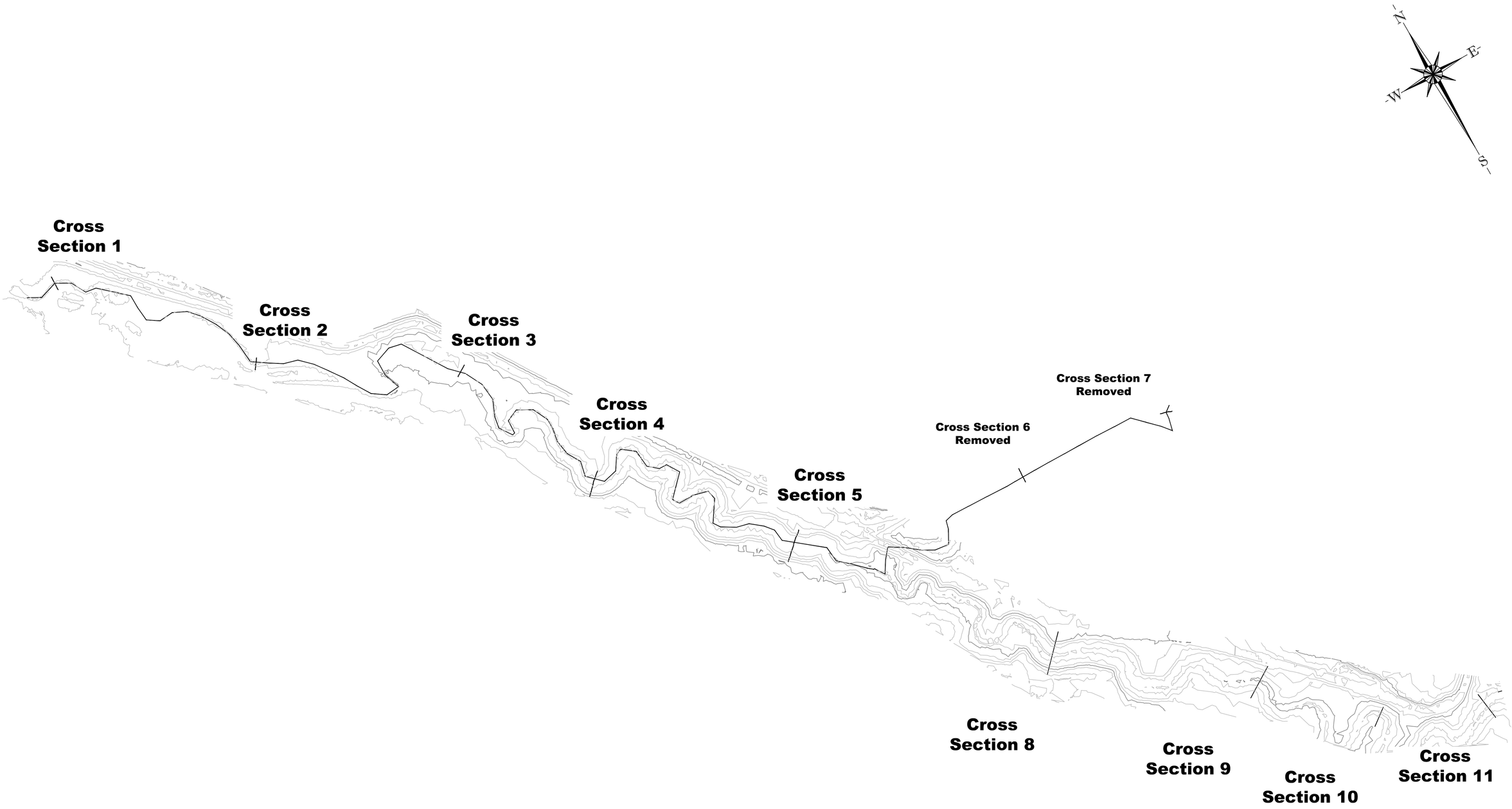
Website: www.sdresources.com.au

Wambo Coal Pty Ltd (Peabody Energy)

BED AND BANK STABILITY SURVEYING
NORTH WAMBO CREEK CROSS SECTIONS
SHEET 20 OF 26 SHEETS

Date	Scale:	Drawn	Checked	Approved
31.03.14	H 1:500 V 1:500	JC	DR	MB

Job J000136
Dwg No. 09577
Rev. A
Sheet A1



NORTH WAMBO CREEK DIVERSION

REVISIONS										
REV.	DATE	BY	DESCRIPTION	CHK.	REV.	DATE	BY	DESCRIPTION	CHK.	

Survey and Drafting Resources

St Patricks Commercial Centre
16 Cambridge Street
Singleton, NSW, 2330

Website: www.sdresources.com.au

Wambo Coal Pty Ltd (Peabody Energy)

BED AND BANK STABILITY SURVEYING
NORTH WAMBO DIVERSION CREEK PLAN
SHEET 21 OF 26 SHEETS

Date	Scale:	Drawn	Checked	Approved
31.03.14	1:5000	JC	DR	MB

Job J000136
Dwg No. 09577
Rev. A
Sheet A1

NTH WAMBO DIV CL
DATUM: 76.00

2014	103.89	103.63	103.36	103.65	103.30	103.19	102.65	102.38	102.23	
2012	104.20	103.77	103.98	103.53	103.54	103.40	102.69	102.70	102.50	
2010	103.66	103.66	103.52	103.38	103.20	103.33	102.78	102.65	102.41	
2009	103.55	103.44	103.41	103.27	103.06	103.08	102.57	102.46	102.23	
CHAINAGE	0.000	36.677	86.244	128.980	171.091	199.523	289.747	323.459	362.419	

JOINS TO "A" BELOW

JOINS TO "A" ABOVE

	102.44	102.16	102.12	101.98	101.74	101.67	101.30	102.04	101.02	100.94
	102.40	102.71	102.16	102.03	101.69	101.83	101.47	101.32	101.16	101.03
	102.29	102.22	102.16	102.00	101.74	101.50	101.40	101.28	101.13	101.11
	102.18	102.06	101.98	101.85	101.65	101.42	101.28	101.12	100.98	100.91
	397.594	435.140	473.547	510.045	554.730	594.719	636.031	683.401	724.656	767.769

JOINS TO "B" BELOW

JOINS TO "B" ABOVE

	100.81	100.86	100.37	100.36	100.49	100.18	100.29	100.07	98.95	99.48
	101.07	101.08	100.52	100.62	101.48	100.50	101.27	100.64	99.68	99.26
	101.02	100.72	100.52	100.46	100.39	100.30	100.16	99.95	99.56	99.30
	100.91	100.63	100.43	100.36	100.22	100.17	100.09	99.86	99.56	99.23
	805.873	848.605	889.260	932.209	967.883	1010.741	1051.151	1087.356	1132.673	1173.247

JOINS TO "C" ON NEXT SHEET

REVISIONS

REV.	DATE	BY	DESCRIPTION	CHK.	REV.	DATE	BY	DESCRIPTION	CHK.

Survey and Drafting Resources

St Patricks Commercial Centre
16 Cambridge Street
Singleton, NSW, 2330

Website: www.sdresources.com.au

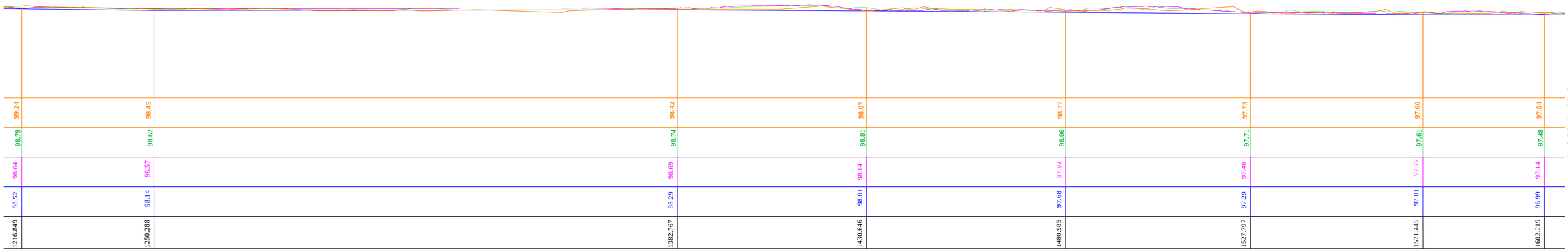
Wambo Coal Pty Ltd (Peabody Energy)

BED AND BANK STABILITY SURVEYING
NORTH WAMBO CREEK DIVERSION LONGITUDINAL SECTION
SHEET 22 OF 26 SHEETS

Date	Scale:	Drawn	Checked	Approved
31.03.14	H & V 1:500	JC	DR	MB

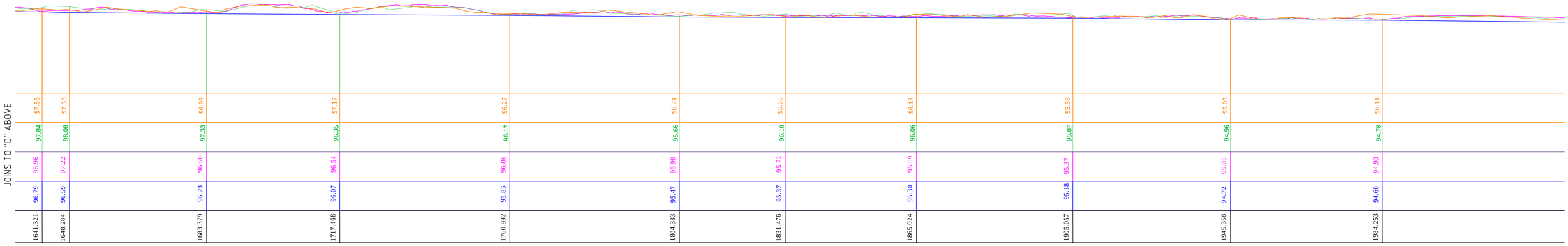
Job J000136
Dwg No. 09577
Rev. A
Sheet A1

JOINS TO "C" ON PREVIOUS SHEET

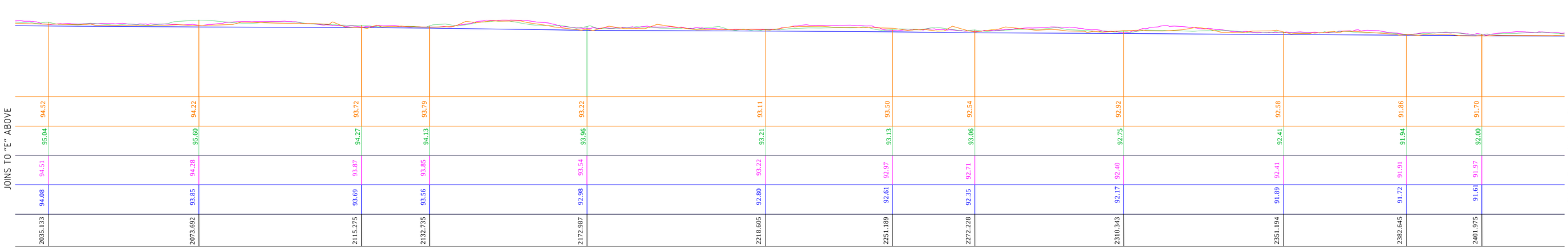


JOINS TO "D" BELOW

JOINS TO "D" ABOVE



JOINS TO "E" ABOVE



JOINS TO "E" BELOW

JOINS TO "F" ON NEXT SHEET

REVISIONS

REV.	DATE	BY	DESCRIPTION	CHK.	REV.	DATE	BY	DESCRIPTION	CHK.

Survey and Drafting Resources

St Patricks Commercial Centre
16 Cambridge Street
Singleton, NSW, 2330

Website: www.sdresources.com.au

Wambo Coal Pty Ltd (Peabody Energy)

BED AND BANK STABILITY SURVEYING
NORTH WAMBO CREEK DIVERSION LONGITUDINAL SECTION
SHEET 23 OF 26 SHEETS

Date	Scale:	Drawn	Checked	Approved
31.03.14	H & V 1:500	JC	DR	MB

Job J000136
Dwg No. 09577
Rev. A
Sheet A1

JOINS TO "F" ON PREVIOUS SHEET

	2310.343	2351.194	2382.645	2401.975	2444.334	2482.373	2507.107	2535.385	2569.965	2590.886	2631.086	2665.341
(orange)	92.92	92.58	91.86	91.70	91.88	91.73	91.06	91.15	91.44	91.38	90.54	90.96
(green)	92.75	92.41	91.94	92.00	91.74	91.26	92.22	91.07	91.22	90.88	90.92	90.69
(magenta)	92.40	92.41	91.91	91.97	91.69	91.27	91.04	90.89	90.70	90.77	90.50	90.50
(blue)	92.17	91.89	91.72	91.61	91.41	91.06	90.82	90.66	90.57	90.41	90.29	90.32

JOINS TO "G" BELOW

JOINS TO "G" ABOVE

	2704.405	2732.350	2764.227	2880.028	2920.722	2961.649	3002.782	3018.650	3021.192	3050.746	3087.541
(orange)	90.94	90.64	90.42	90.56	89.77	89.87	89.38	88.93	88.59	87.71	
(green)	90.21	90.33	90.49	90.14	89.99	89.81	89.15	88.73	88.37	87.77	86.71
(magenta)	90.35	90.38	90.34	90.46	90.21	89.81	89.37	89.08	88.40	87.70	86.93
(blue)	90.26	90.25	90.18	89.96	89.66	89.57	89.20	88.98	88.18	87.56	86.78

JOINS TO "H" BELOW

JOINS TO "H" ABOVE

REMOVED DUE TO DIVERSION

	3119.015	3121.269	3162.651	3206.012	3240.077	3277.329	3315.808	3338.541	3360.759	3407.347	3460.179
(green)	87.67	87.60	86.14	86.42	86.19	85.76	85.47	85.31	85.80	85.24	83.74
(magenta)	86.70	86.54	86.17	85.91	85.81	85.66	85.47	85.38	85.22	85.10	83.53
(blue)	86.72	86.12	86.05	85.77	85.62	85.35	85.29	85.12	85.18	84.54	83.39

JOINS TO "I" ON NEXT SHEET

REVISIONS

REV.	DATE	BY	DESCRIPTION	CHK.	REV.	DATE	BY	DESCRIPTION	CHK.

Survey and Drafting Resources

St Patricks Commercial Centre
16 Cambridge Street
Singleton, NSW, 2330

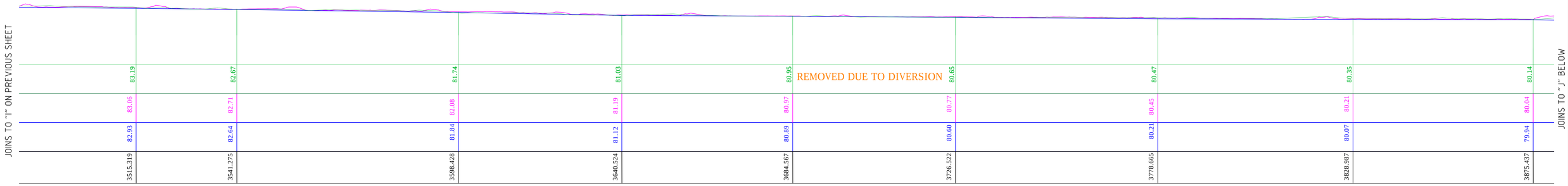
Website: www.sdresources.com.au

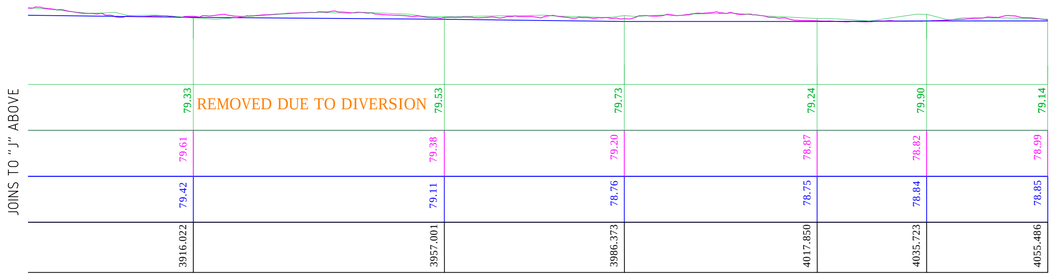
Wambo Coal Pty Ltd (Peabody Energy)

BED AND BANK STABILITY SURVEYING
NORTH WAMBO CREEK DIVERSION LONGITUDINAL SECTION
SHEET 24 OF 26 SHEETS

Date	Scale:	Drawn	Checked	Approved
31.03.14	H & V 1:500	JC	DR	MB

Job J000136
Dwg No. 09577
Rev. A
Sheet A1





REVISIONS

REV.	DATE	BY	DESCRIPTION	CHK.	REV.	DATE	BY	DESCRIPTION	CHK.

Survey and Drafting Resources

St Patricks Commercial Centre
16 Cambridge Street
Singleton, NSW, 2330

Website: www.sdresources.com.au

Wambo Coal Pty Ltd (Peabody Energy)

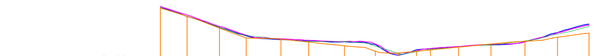
BED AND BANK STABILITY SURVEYING
NORTH WAMBO CREEK DIVERSION LONGITUDINAL SECTION
SHEET 25 OF 26 SHEETS

Date	Scale:	Drawn	Checked	Approved
31.04.14	H & V 1:500	JC	DR	MB

Job J000136
Dwg No. 09577
Rev. A
Sheet A1

2014	105.31	105.18		104.91	104.74	103.61	104.25	104.85	105.16	105.39
2012	105.54	105.26		105.16	104.96	103.78	104.30	105.13	105.18	105.46
2010	105.64		105.39		105.38	103.55	104.03	105.09	105.53	105.59
2009	105.41	105.21		105.19	103.36	104.36	104.96	105.34	105.41	
CHAINAGE	0	7.88		13.43	18.7	21.94	27.33	32.61	37.84	

NTH WAMBO DIVERSION CREEK SECTION 1



2014	102.04	100.71		98.78		97.17		96.97		96.51		95.90		95.03	94.73	94.99	95.22	95.67	96.19	96.63	97.29	97.94
2012	102.08	100.71		98.93		97.59		96.98		96.62		96.56		95.83	94.61	94.91	95.32	95.69	96.02	96.69	97.82	99.07
2010	102.32	100.93		99.07		97.65		97.05		96.79		96.58		96.19	94.66	95.06	95.44	95.77	96.13	96.53	98.00	99.27
2009	102.13	100.66		98.85		97.52		96.90		96.67		96.55		96.09	94.36	95.26	95.43	95.75	96.04	96.53	98.04	99.44
CHAINAGE	0	4.36		9.65		14		19.68		24.2		30.05		35.08	38.91	41.81	44.05	48.64	53.95	59.5	64.82	69.96

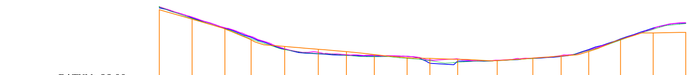
NTH WAMBO DIVERSION CREEK SECTION 4

2014	94.02	93.13	91.89	90.59	89.07	87.26	86.39	86.12	85.85	85.33	84.00	83.81	84.33	84.86	85.45	86.49	87.87	89.81	90.46	91.20	91.24	91.29	91.33	91.36		
CHAINAGE	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00	70.00	75.00	80.00	85.00	90.00	95.00	100.00	105.00	110.00	113.17		

NTH WAMBO DIVERSION CREEK SECTION 8

2014	103.59	103.08	102.63		101.23	102.43	102.43	102.42	102.44
2012	103.71	103.04	102.91		101.82	102.42	102.50	102.53	102.50
2010	104.14	103.13	103.15		101.19	102.48	102.58	102.61	102.62
2009	103.96	102.98	103.02		101.10	102.52	102.50	102.58	102.48
CHAINAGE	0	4.34	9.05		15.63	19.02	22.27	26.54	31.93

NTH WAMBO DIVERSION CREEK SECTION 2



2014	98.76	97.22	95.62	93.83		92.76	92.31	91.92	91.45	90.94	90.82	90.67	90.47	90.86	91.21	91.95	93.88	94.98	95.07			
2012	99.21	97.34	95.65	94.00		92.24	91.60	91.32	91.08	90.82	90.44	90.17	90.43	90.81	91.18	92.12	93.80	95.57	96.50			
2010	99.24	97.55	95.81	94.4		92.4	91.8	91.41	91.36	91.15	90.58	90.74	90.53	90.87	91.3	92.14	93.86	95.65	96.64			
2009	99.06	97.42	95.74	94.25		92.34	91.57	91.33	91.20	91.16	90.02	90.39	90.49	90.82	91.14	92.27	94.00	95.78	96.56			
CHAINAGE	0	5.36	10.73	15		20.47	25.96	30.54	35.09	40.44	44.17	48.7	55.15	60.99	65.58	70.1	75.29	80.61	85.93			

NTH WAMBO DIVERSION CREEK SECTION 5

2014	85.05	85.10	84.86	84.55	84.16	83.06	82.25	81.87	81.49	81.11	79.83	80.31	80.85	81.12	81.62	82.77	84.60	85.70	86.46	86.59						
CHAINAGE	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00	70.00	75.00	80.00	85.00	90.00	91.87						

NTH WAMBO DIVERSION CREEK SECTION 9

2014	99.60	99.31	99.11	98.20	98.60	98.66	98.70	98.76
2012	99.60	99.59	99.47	98.78	98.80	99.09	99.03	98.98
2010	99.68	99.71	99.51	98.6	98.92	99.18	99.15	99.11
2009	99.57	99.65	99.54	98.29	98.96	99.12	99.10	99.01
CHAINAGE	0	7.73	12.94	17.22	20.42	24.84	29.22	34.79

NTH WAMBO DIVERSION CREEK SECTION 3

2012	84.25	84.12	83.50	82.87	82.56	82.70	83.35	84.19	84.75	85.33
2010	84.38	84.26	83.11	82.9	82.33	82.88	83.28	84.47	84.86	85.21
2009	84.37	84.26	83.01	82.85	82.14	82.97	83.34	84.42	84.73	85.20
CHAINAGE	0	2.13	7.04	11.34	15.64	19.66	24.06	28.26	33.59	39.32

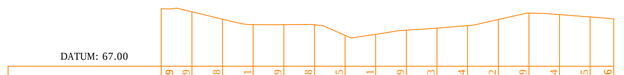
NTH WAMBO DIVERSION CREEK SECTION 6
(REMOVED DUE TO DIVERSION)

2014	79.53	79.07	78.67	78.61	78.56	78.54	77.86	76.14	75.88	76.84	77.80	78.55
CHAINAGE	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	53.80

NTH WAMBO DIVERSION CREEK SECTION 10

2012	80.33	80.34	79.85	80.02	80.34	80.62	81.19
2010	80.39	80.5	80.04	78.91	80.45	80.6	81.15
2009	80.32	80.58	80.14	78.87	80.52	80.67	81.14
CHAINAGE	0	6.32	10.56	17.29	21.65	27.18	31.67

NTH WAMBO DIVERSION CREEK SECTION 7
(REMOVED DUE TO DIVERSION)



2014	76.39	75.89	74.68	73.81	73.79	73.78	72.05	72.21	72.89	73.23	73.64	74.62	75.69	75.44	75.05	74.76	
CHAINAGE	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00	70.00	73.83	

NTH WAMBO DIVERSION CREEK SECTION 11

REVISIONS

REV.	DATE	BY	DESCRIPTION	CHK.	REV.	DATE	BY	DESCRIPTION	CHK.

Survey and Drafting Resources

St Patricks Commercial Centre
16 Cambridge Street
Singleton, NSW, 2330

Website: www.sdresources.com.au

Wambo Coal Pty Ltd (Peabody Energy)

BED AND BANK STABILITY SURVEYING
NORTH WAMBO DIVERSION CREEK CROSS SECTIONS
SHEET 26 OF 26 SHEETS

Date	Scale:	Drawn	Checked	Approved
31.04.14	H 1:500 V 1:500	JC	DR	MB

Job J000136
Dwg No. 09577
Rev. A
Sheet A1